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# **LUMBER RIVER BASIN AQUATIC INVENTORY**

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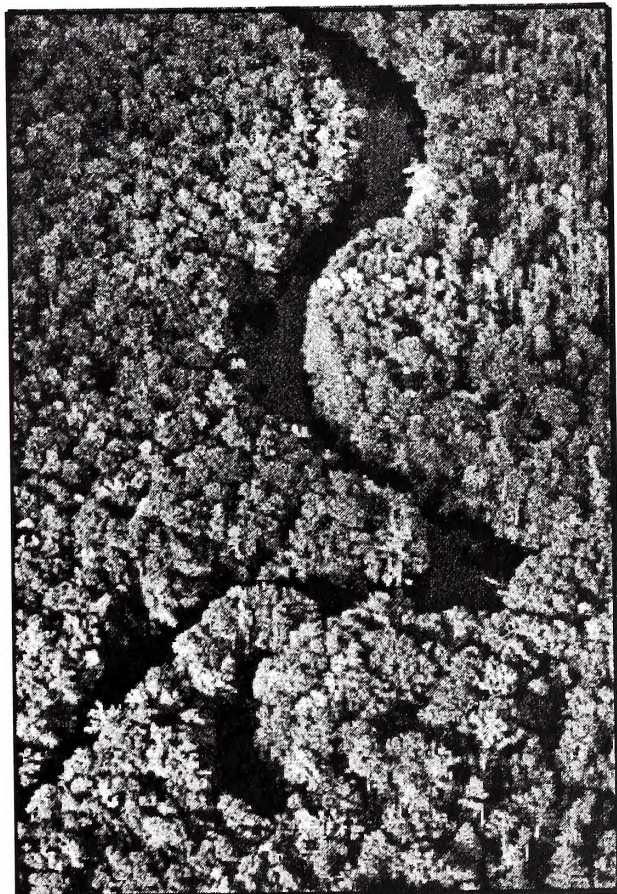




# LUMBER RIVER BASIN AQUATIC INVENTORY



Lumber River



Lumber River



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# **Lumber River Basin Aquatic Inventory**

## **Introduction**

The Lumber River Basin encompasses 8 counties in North Carolina and extends into South Carolina. The headwaters begin in Moore and Montgomery counties and flow through Richmond. On the Hoke/Scotland county line, Drowning Creek becomes the Lumber River at SR 1412 (Scotland Co.) or Bicycle 1. The river then meanders through Robeson and Columbus counties and its tributaries reach into Bladen County. This is a black water system with the acidity levels becoming higher closer to the river. The Lumber River is considered a State Wild and Scenic River.

The Lumber River State Park begins at SR 1412 in Scotland County and ends at the North Carolina/South Carolina border. The park is made up almost entirely of the Lumber River and it comprises 115 river miles and 1600 acres of land. Before the river became a state park, it was used for logging, commercial fishing, trading, and recreational purposes. Due to the concern raised by local citizens, the Division of State Parks purchased land and is in the process of acquiring more land for the park. The Lumber River State Park became available for public use in 1989.

The purpose of this project was to survey for aquatic species, including crayfish, fish, snails, mussels, and sphaeriid clams. Our inventory included the Lumber River Basin in North Carolina. Figure 1 details the localities of all stations surveyed. The following sections provide information on the species in the above taxa documented at each site in the survey area.

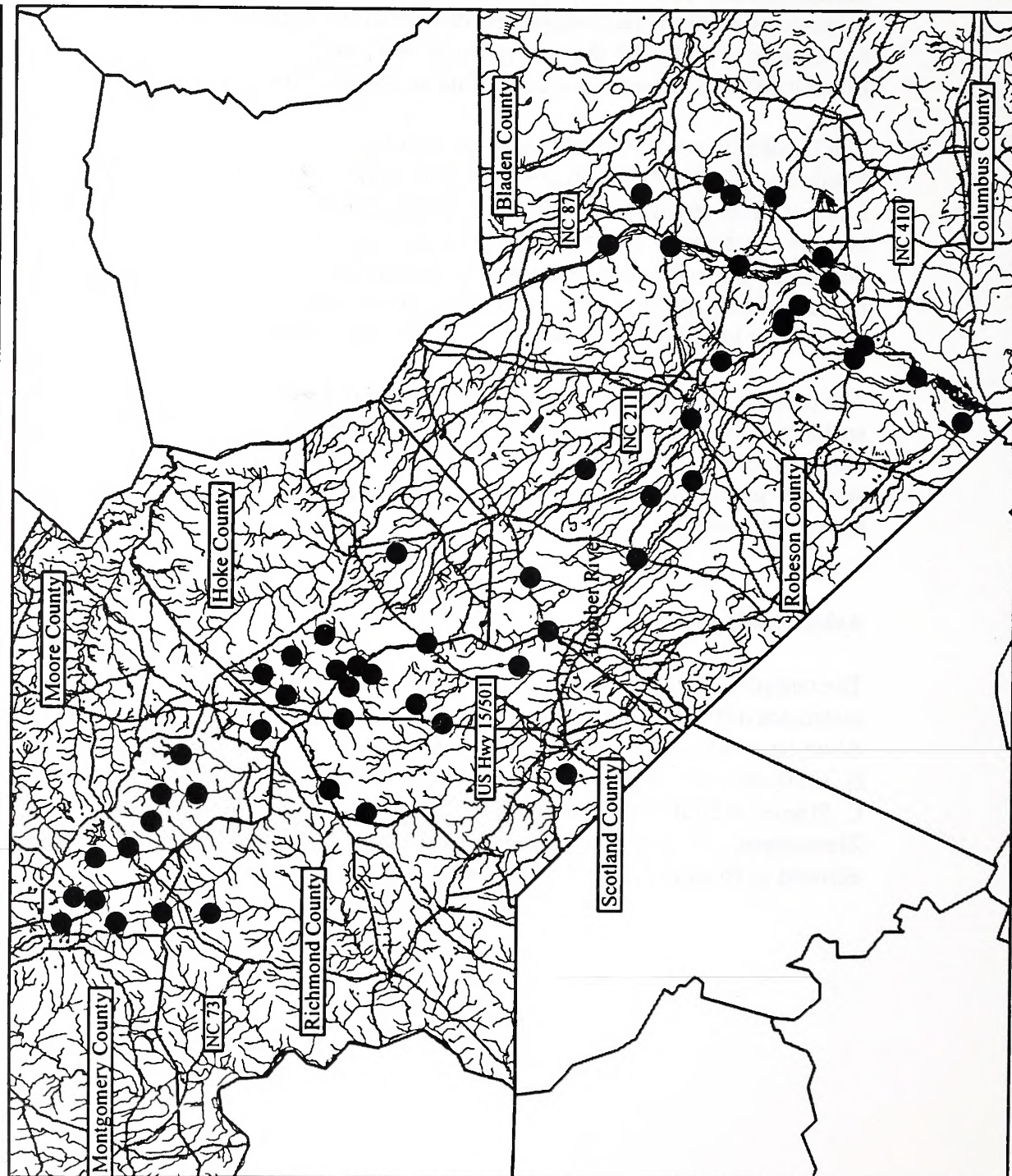
## **Acknowledgments**

The completion of this project would not have been possible without the invaluable assistance of the following people: John M. Alderman, Art Bogan, Keith W. Ashley, Alvin Braswell, Alan R. Clark, John E. Cooper, Tom Henson, Judith A. Johnson, Andrew H. McDaniel, Jr., Chris McGrath, Bob Pegram, Louis P. Polletta, Danny Smith, Wayne C. Starnes, Ken R. Taylor, Randall C. Wilson, Melissa R. Wood, and Mara Savacool Zimmerman. I would also like to thank the state park staff and the landowners who allowed us to work on their properties.

Gabriela B. Mottes

# LUMBER RIVER BASIN AQUATIC INVENTORY

Figure 1.





# Aquatic Snails

## Introduction

There are approximately 500 species of aquatic snails currently recognized in North America. These 500 species are divided into 78 genera and 15 families (Burch 1989). In North Carolina, there are approximately 52 species representing 8 families (Adams 1990).

Snails are grouped into one of two subclasses. Prosobranch snails are gill-breathing and have an operculum, which is a calcareous plate that closes the aperture when the snail withdraws into its shell. Pulmonate snails are lung-breathing and do not have an operculum to seal their aperture (Burch 1989).

These animals graze on algae and other microscopic organisms using radular teeth to grind food to an appropriate size for consumption. Snails are an essential part of aquatic ecosystems, as well as indicators of water quality. However, they are typically overlooked. The lack of information and knowledge of snails can be attributed, in part, to their minute size, perceived lack of activity, cryptic habits, and difficulty in identification.

## Methods

Study areas for this project included the aquatic habitats associated with the Lumber River Basin (Fig. 1, Introduction Section). Most habitats of the headwaters of the Lumber River Basin can be described as riffle/run with slow to fast flow. Pools of different sizes with slow flow were also present. Substrate included combinations of silt/sand/gravel/woody debris and leaf litter. Aquatic vegetation and organic debris were also present. The river habitat was slow to fast flow pools, with a silt/sand/gravel/woody debris and leaf litter substrate. Certain tributaries of the river were swampy with abundant aquatic vegetation. Throughout the basin there was a good hardwood/pine buffer with occasional cypress. The pH in this basin ranged from 4.3 - 7.2.

Snails were collected throughout the Lumber River Basin (Fig. 1). Various techniques were utilized including visual and tactile searches. Due to the cryptic habits of some snail species, it was necessary to sift and dredge the substrate. All available habitats were sampled. Snails were preserved and stored in 70% ethanol.

Snails and limpet snails were identified using Burch (1989) and Basch (1963). Expected distributions and the following characteristics were used to identify the specimens: presence/absence of an operculum, direction of coiling, shell size, shape, color and thickness, texture of the shell, placement of apex, shape and number of the whorls, and the shape of the apertural lip. With the acquisition of additional information, identifications may be subject to change.

## Results and Discussion

Snails were located at twenty-two of the sites surveyed (Fig. 1). At least nine species representing six families and both subclasses were found within the Lumber River Basin (Table 1).

*Campeloma decisum* (Say, 1816), *Pseudosuccinea columella* (Say, 1817), *Physella* sp., and *Helisoma anceps* (Menke, 1830) were collected in the backwater areas with slow flow in the silt/sand substrate. *Helisoma anceps*, *Pseudosuccinea columella*, and *Physella* sp. were also found on aquatic vegetation, along with *Menetus dilatatus* (Gould, 1841). *Campeloma decisum* is considered a species complex (Adams, pers. comm. 1995). Therefore, when more information is acquired, this species complex may be separated into a few recognizable species.

*Gillia altilis* (I. Lea, 1841) was found on aquatic vegetation. The limpet snails, *Ferrissia fragilis* (Tryon, 1863), *Ferrissia rivularis* (Say, 1817), and *Laevapex fuscus* (C.B. Adams, 1841), were found on the underside of the leaves of the aquatic vegetation and on rocks and woody debris in the slower current.

The Lumber River Basin supports a good abundance and diversity of snails. As is shown in Table 2, most species were found in good numbers at each site.

## Resources

Adams, W/ F. 1995. Personal communication.

Adams, W. F. (ed). 1990. *A report on the conservation status of North Carolina's Freshwater and Terrestrial Molluscan fauna*. The Scientific Council on Freshwater and Terrestrial Mollusks. 246 pp.

Basch, P. F. 1963. A review of the recent freshwater limpet snails of North America (Mollusca: Pulmonata). *Bulletin: Museum of Comparative Zoology*, Harvard University. 129(8): 399-461.

Burch, J. B. 1989. *North American Freshwater Snails*. Malacological Publications. Hamburg, MI. 365 pp.

Turgeon, D. D., et. al. 1988. *Common and Scientific Names of Aquatic Invertebrates from the United States and Canada: Mollusks*. American Fisheries Society. Bethesda, MA. 277 pp + figures.



Table 1. Snails found in the Lumber River Basin

**Prosobranchia**

Hydrobiidae

*Gillia altilis* (I. Lea, 1841)

Buffalo pebblesnail

Viviparidae

*Campeloma decisum* (Say, 1816)

Pointed campeloma

**Pulmonata**

Lymnaeidae

*Pseudosuccinea columella* (Say, 1817)

Mimic lymnaea

Physidae

*Physella* sp.

Planorbidae

*Helisoma anceps* (Menke, 1830)

Two-ridge rams-horn

*Menetus dilatatus* (Gould, 1841)

Bugle sprite

Ancylidae

*Ferrissi fragilis* (Tryon, 1863)

Fragile ancylid

*Ferrissia rivularis* (Say, 1817)

Creeping ancylid

*Laevapex fuscus* (C.B. Adams, 1841)

Dusky ancylid

# LUMBER RIVER BASIN AQUATIC SNAIL SPECIES INVENTORY

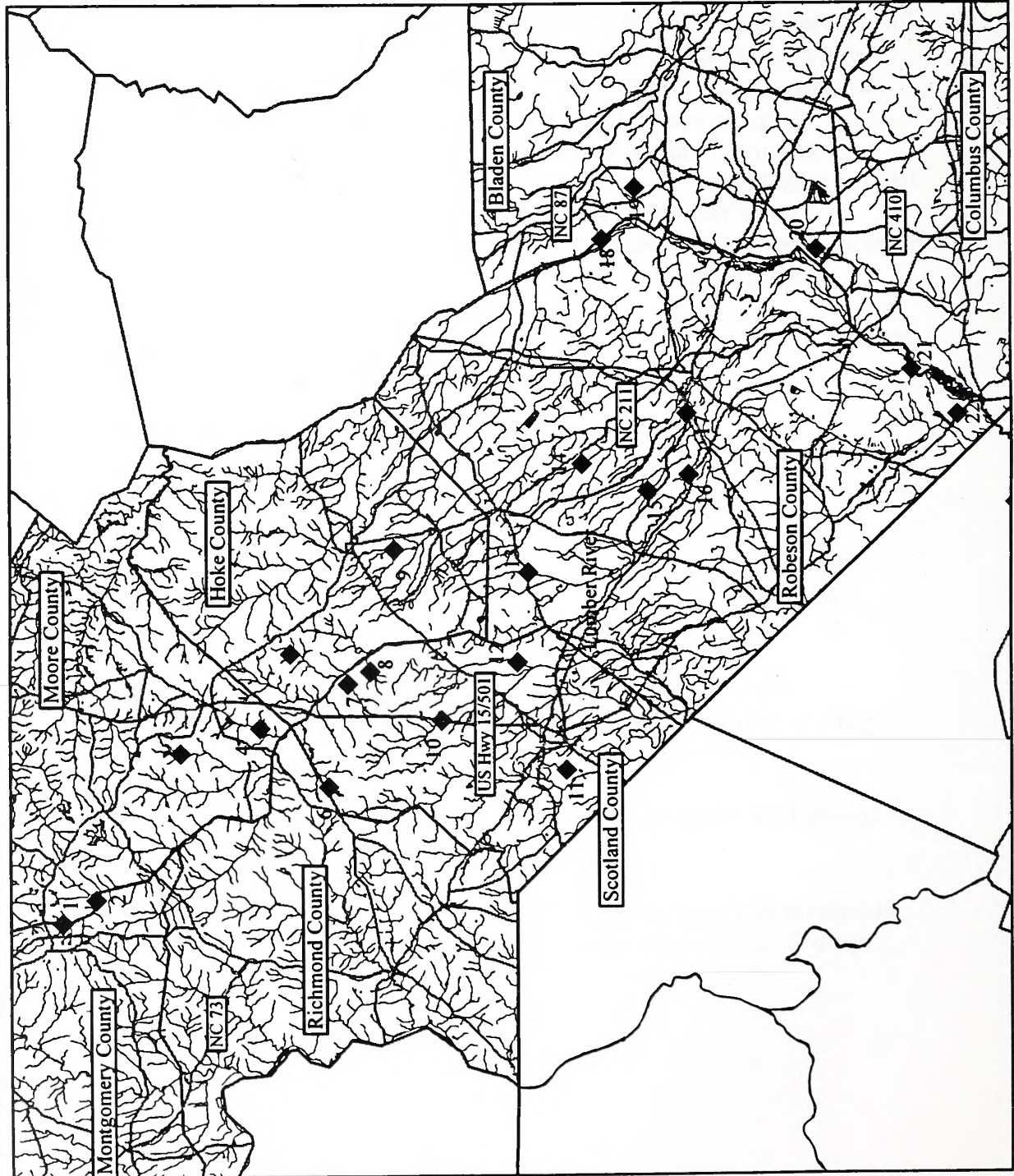


Figure 1.

Dot No.	Station No.
1	970401.1
2	970401.2
3	970402.1
4	970415.2
5	970416.3
6	970723.1
7	970417.2
8	970417.3
9	970722.2
10	960718.3
11	970515.3
12	970515.2
13	970721.1
14	970722.1
15	970721.2
16	960716.4
17	960717.7
18	970612.3
19	970709.4
20	970709.1
21	960716.1
22	960716.2



Table 2. Snails found in the Lumber River Basin

Station No.	Scientific Name	Waterway	Common Locality	County	Date	No.	Identified By
960716.1	<i>Campeloma decisum</i>	Lumber River	SR 2246/2247, LRSP	Colum./Rob. line	16 July 1996	8	G.B. Mottesi
960716.2	<i>Ferrissia fragilis</i>	Roadside ditch	SR 2256	Robeson	16 July 1996	11	G.B. Mottesi
960716.4	<i>Physella</i> sp.	Lumber River	SR 1550	Robeson	16 July 1996	6	G.B. Mottesi
960717.7	<i>Campeloma decisum</i>	Lumber River	NC 72 (boat ramp)	Robeson	17 July 1996	3	G.B. Mottesi
960718.3	<i>Laevapex fuscus</i>	Juniper Creek	US 15/501	Scotland	18 July 1996	10	G.B. Mottesi
970401.1	<i>Helisoma anceps</i>	Drowning Creek	SR 1514	Mont./Moore line	1 April 1997	1	G.B. Mottesi
970401.2	<i>Physella</i> sp.	Drowning Creek	SR 1571	Mont./Moore line	1 April 1997	1	G.B. Mottesi
970402.1	<i>Pseudosuccinea columella</i>	Horse Creek	SR 1115	Moore	2 April 1997	1	A. Bogan
970415.2	<i>Ferrissia rivularis</i>	trib. to Drowning Creek	SR 1100	Moore	15 April 1997	7	G.B. Mottesi
970416.3	<i>Ferrissia rivularis</i>	Mountain Creek	SR 1219	Hoke	16 April 1997	3	G.B. Mottesi
970417.2	<i>Ferrissia fragilis</i>	trib. to Drowning Creek	SR 1400	Scotland	17 April 1997	7	G.B. Mottesi
970417.3	<i>Ferrissia fragilis</i>	trib. to Drowning Creek	SR 1412	Scotland	17 April 1997	22	G.B. Mottesi
970515.2	<i>Physella</i> sp.	Big Shoe Heel Creek	SR 1433	Scotland	15 May 1997	3	G.B. Mottesi
970515.2	<i>Menetus dilatatus</i>	Big Shoe Heel Creek	SR 1433	Scotland	15 May 1997	2	G.B. Mottesi
970515.2	<i>Laevapex fuscus</i>	Big Shoe Heel Creek	SR 1433	Scotland	15 May 1997	2	G.B. Mottesi
970515.3	<i>Laevapex fuscus</i>	Big Shoe Heel Creek	SR 1108	Scotland	15 May 1997	4	G.B. Mottesi
970515.3	<i>Menetus dilatatus</i>	trib. to Gum Swamp Creek	SR 1108	Scotland	15 May 1997	6	G.B. Mottesi
970515.3	<i>Physella</i> sp.	trib. to Gum Swamp Creek	SR 1108	Scotland	15 May 1997	4	G.B. Mottesi
970515.3	<i>Pseudosuccinea columella</i>	trib. to Gum Swamp Creek	SR 1108	Scotland	15 May 1997	23	G.B. Mottesi
970612.3	<i>Laevapex fuscus</i>	Big Swamp	SR 1004	Bladen/Rob. line	12 June 1997	36	G.B. Mottesi
970709.1	<i>Ferrissia fragilis</i>	Slender Branch	NC 242	Bladen	9 July 1997	10	G.B. Mottesi
970709.4	<i>Ferrissia fragilis</i>	Black Reedy Meadows Swamp	SR 1341	Bladen	9 July 1997	43	G.B. Mottesi
970721.1	<i>Pseudosuccinea columella</i>	Jordan's Swamp	NC 71	Robeson	21 July 1997	2	G.B. Mottesi
970721.2	<i>Pseudosuccinea columella</i>	Bear Swamp	SR 1003	Robeson	21 July 1997	9	G.B. Mottesi
970721.2	<i>Physella</i> sp.	Bear Swamp	SR 1003	Robeson	21 July 1997	4	G.B. Mottesi
970721.2	<i>Gillia altilis</i>	Bear Swamp	SR 1003	Robeson	21 July 1997	17	G.B. Mottesi
970721.2	<i>Menetus dilatatus</i>	Bear Swamp	SR 1003	Robeson	21 July 1997	6	G.B. Mottesi
970722.1	<i>Laevapex fuscus</i>	Richland Swamp	SR 1318	Robeson	22 July 1997	37	G.B. Mottesi
970722.1	<i>Pseudosuccinea columella</i>	Richland Swamp	SR 1318	Robeson	22 July 1997	7	G.B. Mottesi
970722.1	<i>Physella</i> sp.	Richland Swamp	SR 1318	Robeson	22 July 1997	1	G.B. Mottesi
970722.1	<i>Menetus dilatatus</i>	Richland Swamp	SR 1318	Robeson	22 July 1997	1	G.B. Mottesi
970722.2	<i>Ferrissia fragilis</i>	Toney's Creek	SR 1138	Hoke	22 July 1997	13	G.B. Mottesi
970722.2	<i>Physella</i> sp.	Toney's Creek	SR 1138	Hoke	22 July 1997	1	G.B. Mottesi
970722.2	<i>Pseudosuccinea columella</i>	Toney's Creek	SR 1138	Hoke	22 July 1997	17	G.B. Mottesi
970723.1	<i>Laevapex fuscus</i>	Muddy Creek	SR 1328, Sandhills Game.	Scotland	23 July 1997	5	G.B. Mottesi

# Freshwater Mussels and Sphaeriid Clams

## Introduction

Freshwater mussels are in the Class Bivalvia. As the name implies, the mussel is separated into right and left shell-secreting centers. The shell itself is a single entity which is divided into right and left portions. Mussels are characterized by having greatly enlarged gills with ciliated filaments for filter feeding. They are an integral part of many aquatic ecosystems. They provide nutrients for insects and other invertebrates and are a food source for other organisms. Due to the fact that they are filter feeders, they are excellent indicators of water quality.

There are approximately 300 species and subspecies of freshwater mussels in the United States. The greatest diversity of these mussels occurs in the Southeast. Roughly 70 species can be found in North Carolina. Unfortunately, approximately half are state listed as Endangered, Threatened, or species of Special Concern (Adams 1990). It appears that the mussel fauna of the United States is in danger of extinction (Williams, et al. 1992). Therefore, it is necessary that we determine the status and distribution of these organisms so that proper management techniques can be applied.

Sphaeriid clams, like freshwater mussels, are in the Class Bivalvia and are filter feeders. The members of this family are considered the pea, pill, nut, or fingernail clams. Due to their well-developed mechanism of passive dispersal and adaptability, sphaeriid clams can be found in almost any body of freshwater. Therefore, their distributions are considered truly cosmopolitan (Branson 1988). In spite of their cosmopolitan distribution, not much is known about sphaeriid clams. They are represented in North America by 38 species of the family Sphaeriidae. In North Carolina, there are approximately 13 species of sphaeriid clams (Adams 1990).

One exotic species, the Asian clam (*Corbicula fluminea* (Müller 1774)), of the family Corbiculidae (Burch 1975) was introduced into this country in 1937 and was found in most of the area surveyed.

## Methods

Study areas for this project included the aquatic habitats associated with the Lumber River Basin (Fig. 1, Introduction Section). Most habitats of the headwaters of the Lumber River Basin can be described as riffle/run with slow to fast flow. Pools of different sizes with slow flow were also present. Substrate included combinations of silt/sand/gravel/woody debris and leaf litter. Aquatic vegetation and organic debris were also present. The river habitat was slow to fast flow pools, with a silt/sand/gravel/woody debris and leaf litter substrate. Certain tributaries of the river were swampy with



abundant aquatic vegetation. Throughout the basin there was a good hardwood/pine buffer with occasional cypress. The pH in this basin ranged from 4.3 - 7.2.

Freshwater mussels were collected throughout the Lumber River Basin (Fig. 1). Various techniques were utilized including SCUBA, snorkeling, sifting of the substrate, visual and tactile searches, and visual searches of the shores for shells. Live mussels were identified, measured, and returned unharmed to the appropriate habitat. Fresh shells were identified, measured, and kept for curation.

Sphaeriid clams were also collected throughout the Lumber River Basin (Fig. 2). Various techniques were utilized including seining, dip netting, sifting of the substrate, and visual and tactile searches. Specimens were preserved and stored in 70% ethanol. Sphaeriid clams were identified using Branson (1988), Burch (1975), and Clarke (1981). With the acquisition of additional information, identifications made of both freshwater mussels and sphaeriid clams may be subject to change.

## Results and Discussion

Figure 1 details the localities of the six stations where freshwater mussels were found. At least four species of mussels, all in the family Unionidae, were found in the Lumber River Basin.

Figure 2 details the localities of the seven stations where sphaeriid clams were found. At least three species, all within the family Sphaeriidae, were found in the Lumber River Basin.

The specimens falling into either the *Elliptio complanata* or *Elliptio icterina* complexes were listed under the *Elliptio* spp. category. Therefore, these complexes possibly contain several species. The ecophenotypes of these *Elliptio* complexes are found at numerous sites throughout eastern North Carolina (Alderman, pers. comm., 1998). Additional genetic information is necessary to determine the number of species within these complexes.

Fair diversity and abundance of both mussels and sphaeriid clams occur in the Lumber River Basin (Table 2). The fair diversity and abundance may be due to do the high acidity levels of areas within this basin. It has been suggested that at a pH of below 7.0 the calcareous shells of mollusks become highly soluble and this requires that these animals precipitate fresh calcium carbonate faster than it can be dissolved (D'itri 1982). This creates a stress for these organisms because of the reduction of the availability of the calcium carbonate necessary for shell development. Unfortunately, no work has been done to see how pH affects organisms that have been established for a prolonged period of time in a low pH environment.

## Resources

- Adams, W. F. (ed). 1990. *A report on the conservation status of North Carolina's Freshwater and Terrestrial Molluscan fauna*. The Scientific Council on Freshwater and Terrestrial Mollusks. 246 pp.
- Alderman, J. M. 1998. Personal communication.
- Burch, J. B. 1975. *Freshwater Sphaeriacean Clams (Mollusca: Pelecypoda) of North America*. Museum and Department of Zoology, University of Michigan. Ann Arbor, MI. 96 pp.
- Branson, B. A. 1988. The Sphaeriacean Clams (Mollusca: Bivalvia) of Kentucky. *Transactions of the Kentucky Academy of Science*. 49(1-2): 8-14.
- Clarke A. H. 1981. *The Freshwater Molluscs of Canada*. National Museum of Natural Sciences/National Museums of Canada. Ottawa, Canada. 446 pp.
- D'itir, F. M. 1982. *Acid Precipitation: Effects on Ecological Systems*. Ann Arbor Science Publishers. Ann Arbor, MI.
- Johnson, R. I. 1970. *The Systematics and Zoogeography of the Unionidae (Mollusca: Bivalvia) of the Southern Atlantic Slope Region*. Harvard University. Cambridge, MS. 140(6): 263-450.
- Turgeon, D. D., et. al. 1988. *Common and Scientific Names of Aquatic Invertebrates from the United States and Canada: Mollusks*. American Fisheries Society. Bethesda, MA. 277 pp + figures.
- Williams, J. D., M. L. Warren, Jr., K. S. Cummings, J. L. Harris, and R. J. Neves. 1992. Conservation status of freshwater mussels of the United States and Canada. American Fisheries Society. Bethesda, MA. *Fisheries* 18(9): 6-22.



Table 1. Mussels and Sphaeriid clams found in the Lumber River Basin

Unionidae

*Elliptio congraea* (I. Lea, 1831) Carolina slabshell

*Elliptio* spp.

lanceolate elliptio

*Uniomerus* sp.

Sphaeriidae

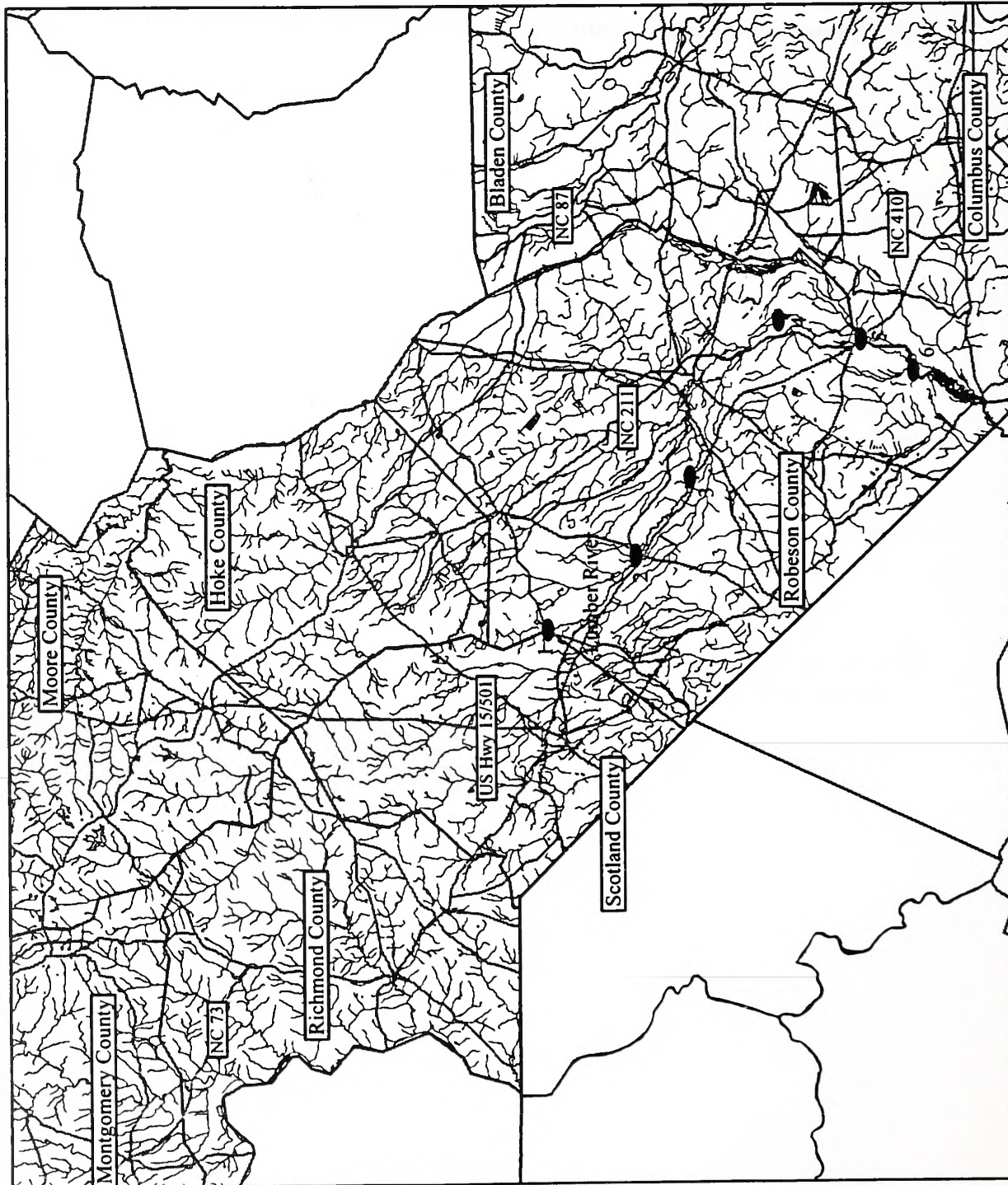
*Musculium securis* (Prime, 1852) Pond fingernailclam

*Pisidium* sp.

*Sphaerium striatinum* (Lamarck, 1818) Striated fingernailclam

# LUMBER RIVER BASIN MUSSEL SPECIES INVENTORY

Figure 1.



Dot No.  
1  
2  
3  
4  
5  
6

Station No.  
971007.2  
960718.1  
960716.4  
960717.4  
960717.1  
960716.1

Miles  
0 10 20

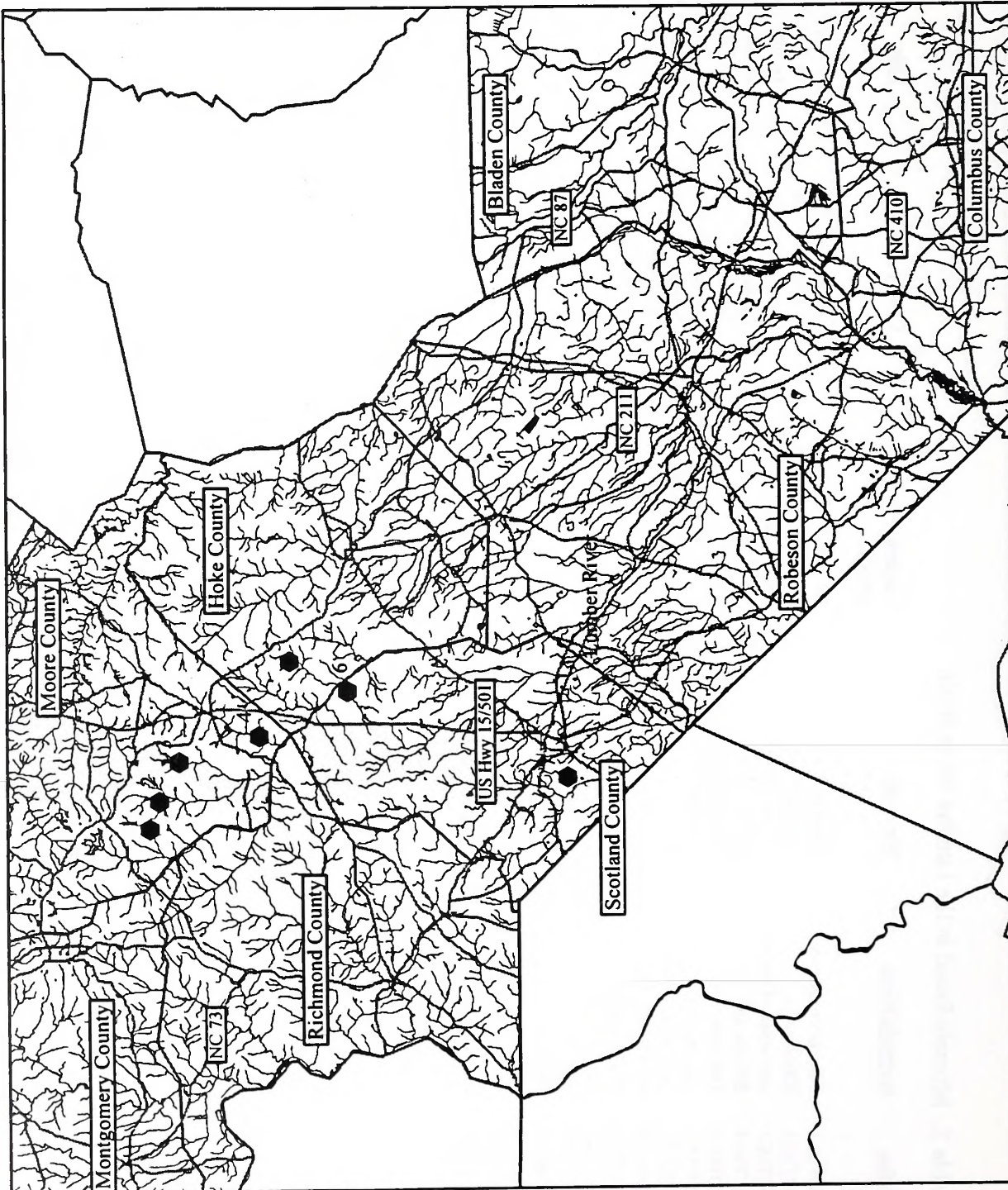


Table 2. Mussels found in the Lumber River Basin

<u>Station No.</u>	<u>Scientific Name</u>	<u>Waterway</u>	<u>Common Locality</u>	<u>County</u>	<u>Date</u>	<u>No. (live)</u>	<u>No. (shell)</u>
960716.1	<i>Elliptio congaraea</i>	Lumber River	SR 2246/2247, LRSP	Colum./Rob. line	16 July 1996	2	5
960716.1	<i>Elliptio spp.</i>	Lumber River	SR 2246/2247, LRSP	Colum./Rob. line	16 July 1996	4	35
960716.1	<i>lanceolate elliptio</i>	Lumber River	SR 2246/2247, LRSP	Colum./Rob. line	16 July 1996	1	2
960716.4	<i>Elliptio spp.</i>	Lumber River	SR 1550	Robeson	16 July 1996		120
960716.4	<i>Uniomereus sp.</i>	Lumber River	SR 1550	Robeson	16 July 1996		2
960717.1	<i>Elliptio spp.</i>	Lumber River	US 74, Wildlife Boat Ramp	Colum./Rob. line	17 July 1996	12	
960717.1	<i>lanceolate elliptio</i>	Lumber River	US 74, Wildlife Boat Ramp	Colum./Rob. line	17 July 1996	5	
960717.4	<i>lanceolate elliptio</i>	Lumber River	SR 2123	Robeson	17 July 1996		observed
960717.4	<i>Elliptio spp.</i>	Lumber River	SR 2123	Robeson	17 July 1996	1	observed
960718.1	<i>Elliptio spp.</i>	Lumber River	NC 710	Robeson	18 July 1996	3	
960718.1	<i>Uniomereus sp.</i>	Lumber River	NC 710	Robeson	18 July 1996	2	1
971007.1	<i>Elliptio congaraea</i>	Lumber River	SR 2246/2247, LRSP	Colum./Rob. line	7 Oct. 1997		
971007.1	<i>lanceolate elliptio</i>	Lumber River	SR 2246/2247, LRSP	Colum./Rob. line	7 Oct. 1997	1	1
971007.1	<i>Uniomereus sp.</i>	Lumber River	SR 2246/2247, LRSP	Colum./Rob. line	7 Oct. 1997	16	1
971007.1	<i>Elliptio spp.</i>	Lumber River	SR 2246/2247, LRSP	Colum./Rob. line	7 Oct. 1997		12
971007.2	<i>Elliptio spp.</i>	Lumber River	NC 71	Rob./Scot. line	7 Oct. 1997		28
971007.2	<i>Uniomereus sp.</i>	Lumber River	NC 71	Rob./Scot. line	7 Oct. 1997		

# LUMBER RIVER BASIN SPHAERIID CLAM SPECIES INVENTORY

Figure 2.



Dot No.	Station No.
1	970402.4
2	970402.2
3	970402.1
4	970415.2
5	970416.3
6	970417.2
7	970515.3



Table 3. Sphaeriid clams found in the Lumber River Basin

<u>Station No.</u>	<u>Scientific Name</u>	<u>Waterway</u>	<u>Common Locality</u>	<u>County</u>	<u>Date</u>	<u>No.</u>	<u>Identified By</u>
970402.1	<i>Musculium securis</i>	Horse Creek	SR 1115	Moore	2 April 1997	4	A. Bogan
970402.1	<i>Pisidium</i> sp.	Horse Creek	SR 1115	Moore	2 April 1997	8	A. Bogan
970402.2	<i>Musculium securis</i>	Deep Creek	SR 1122	Moore	2 April 1997	2	G.B. Mottesi
970402.4	<i>Musculium securis</i>	trib. to Drowning Creek	SR 1122	Moore	2 April 1997	1	G.B. Mottesi
970415.2	<i>Musculium securis</i>	trib. to Drowning Creek	SR 1100	Moore	15 April 1997	1	G.B. Mottesi
970416.3	<i>Musculium securis</i>	Mountain Creek	SR 1219	Hoke	16 April 1997	2	G.B. Mottesi
970417.2	<i>Sphaerium striatinum</i>	trib. to Drowning Creek	SR 1400	Scotland	17 April 1997	1	G.B. Mottesi
970515.3	<i>Musculium securis</i>	trib. to Gum Swamp Creek	SR 1108	Scotland	15 May 1997	9	G.B. Mottesi

# **Crayfish**

## **Introduction**

There are currently 338 recognized species of crayfish in the United States and Canada, the greatest diversity of which reside in the Southeast (Taylor et al. 1996). In North Carolina, there are 30 native and 2 introduced species of crayfish (Cooper, pers. comm., 1998). Of these 32 species, nine are listed as significantly rare by the North Carolina Natural Heritage Program (LeGrand and Hall 1995).

Crayfish play a significant role in aquatic ecosystems by representing a large percentage of the biomass in lentic and lotic waters. They are gill breathing organisms and require an aquatic habitat to absorb oxygen from the water. In accordance with habitat preferences, crayfish are classified as either non-burrowers or burrowers. Non-burrowers spend their entire life in the stream bed while burrowers excavate tunnels in roadside ditches, wet pastures, and flood plains (Taylor et al. 1996). Different species of burrowers spend different amounts of their life cycle in subterranean domains.

In the family Cambaridae (which includes all North Carolina species), there are two designations for adult male crayfish: Form I and Form II. Throughout their lives, adult males cycle between these forms. Morphologically both forms are similar except in the texture and shape of the first pleopod (the sexual organ). Form I males are able to sexually reproduce while Form II males are not. Unlike adult males, adult females do not cycle between morphological forms and once they reach adulthood, they can sexually reproduce.

## **Methods**

Study areas for this project included the aquatic habitats associated with the Lumber River Basin (Fig. 1, Introduction Section). Most habitats of the headwaters of the Lumber River Basin can be described as riffle/run with slow to fast flow. Pools of different sizes with slow flow were also present. Substrate included combinations of silt/sand/gravel/woody debris and leaf litter. Aquatic vegetation and organic debris were also present. The river habitat was slow to fast flow pools, with a silt/sand/gravel/woody debris and leaf litter substrate. Certain tributaries of the river were swampy with abundant aquatic vegetation. Throughout the basin there was a good hardwood/pine buffer with occasional cypress. The pH in this basin ranged from 4.3 - 7.2.

Crayfish were collected throughout the Lumber River Basin (Fig. 1). Collecting techniques included the use of dip nets, and a 6' x 10' minnow seine. Specimens were preserved and stored in 70% ethanol.



The following sources were consulted for identification: Cooper (1998), Hobbs (1989), Hobbs (1991), and Page (1985). Dr. John Cooper, NC State Museum of Natural Sciences, and Mara Savacool Zimmerman also provided invaluable assistance. With additional information, the present identifications may be subject to change.

The key feature used to differentiate crayfish species from one another is the morphology and structure of the first pleopod pair of the Form I male. Form II males, juvenile males, and females can be recognized by their carapace, chelae, rostrum shape, and body coloration.

Specimens were recorded as Form I male (MI), Form II male (MII), juvenile male (jM), adult female (F), and juvenile female (jF). Adult versus juvenile specimens were distinguished based on size. Carapace length was measured from the tip of the rostrum to the posterior carapace edge (Page 1985).

## Results and Discussion

Figure 1 details the localities of the thirty-five stations where crayfish were found. Four species of crayfish were found within the Lumber River Basin (Table 1).

*Cambarus (P.)* sp. C was found in riffle/run habitat over sand/gravel. A total of 57 specimens were collected (2MI, 13MII, 17jM, 12F, 13jF). Carapace length ranged from 14.80 to 38.05 mm. Form I males were collected on 2 & 16 April 1997. *Cambarus (P.)* sp. C is a species complex which occurs across the Coastal Plain, Piedmont, and Mountain physiographic regions of North Carolina and currently awaits further clarification (Cooper and Braswell 1995).

*Procambarus (O.) acutus acutus* (Girard, 1852) was found in pool habitat and among aquatic vegetation. A total of 21 specimens were collected (2MI, 5MII, 3jM, 9F, 2jF). Carapace length ranged from 10.90 to 38.45 mm. Form I males were collected on 15 & 16 April 1996.

*Procambarus (O.) blandingii* (Harlan, 1830) was found in pool habitat and among aquatic vegetation. A total of 59 specimens were collected (5MI, 21MII, 6jM, 17F, 10jF). Carapace length ranged from 6.00 to 39.60 mm. Form I males were collected on 16 & 18 July 1996, 2 April and 15 May 1997.

*Procambarus (O.) pearsei* (Creaser, 1934) was found in pool habitat and among aquatic vegetation. A total of 13 specimens were collected (2MII, 2jM, 8F, 1jF). Carapace length ranged from 15.75 to 25.30 mm.

There is a good diversity and distribution of crayfish within the Lumber River Basin (Table 2).

## Resources

- Cooper, J. E. 1998. Personal communication.
- Cooper, J. E. 1998. Unpublished preliminary eclectic keys to the native crayfishes of North Carolina. I. Coastal Plain and Piedmont Plateau, East of the Yadkin-Pee River Basin.
- Cooper, J. E. and A. L. Braswell. 1995. Observations on North Carolina crayfishes. (Decapoda: Cambaridae). *Brimleyana*. 22: 87-132.
- Hobbs, H. H., Jr. 1991. Unpublished key to North Carolina crayfish.
- Hobbs, H. H., Jr. 1989. An illustrated checklist of the American crayfishes (Decapoda: Astacidae, Cambaridae, and Parastacidae). *Smithsonian Contributions to Zoology*. 480: 236 p. Figs: 1-379.
- LeGrand, H. E., Jr. and S. P. Hall. 1995. *Natural Heritage Program list of the rare animal species of North Carolina*. North Carolina Natural Heritage Program. 67 p.
- Page, L. M. 1985. The crayfishes and shrimps (Decapoda) of Illinois. *Illinois Natural History Survey Bulletin*. 33(4): 335-347.
- Taylor, C. A., M. L. Warren, Jr., J. F. Fitzpatrick, Jr., H. H. Hobbs III, R. F. Jezerinac, W. L. Pflieger, and H. W. Robison. 1996. Conservation status of crayfishes of the United States and Canada. *Fisheries*. 21(4): 25-37.



Table 1. Crayfish found in the Lumber River Basin

Cambaridae

*Cambarus (Puncticambarus) sp. C*

*Procambarus (Ortmannicus) acutus acutus* (Girard, 1852)

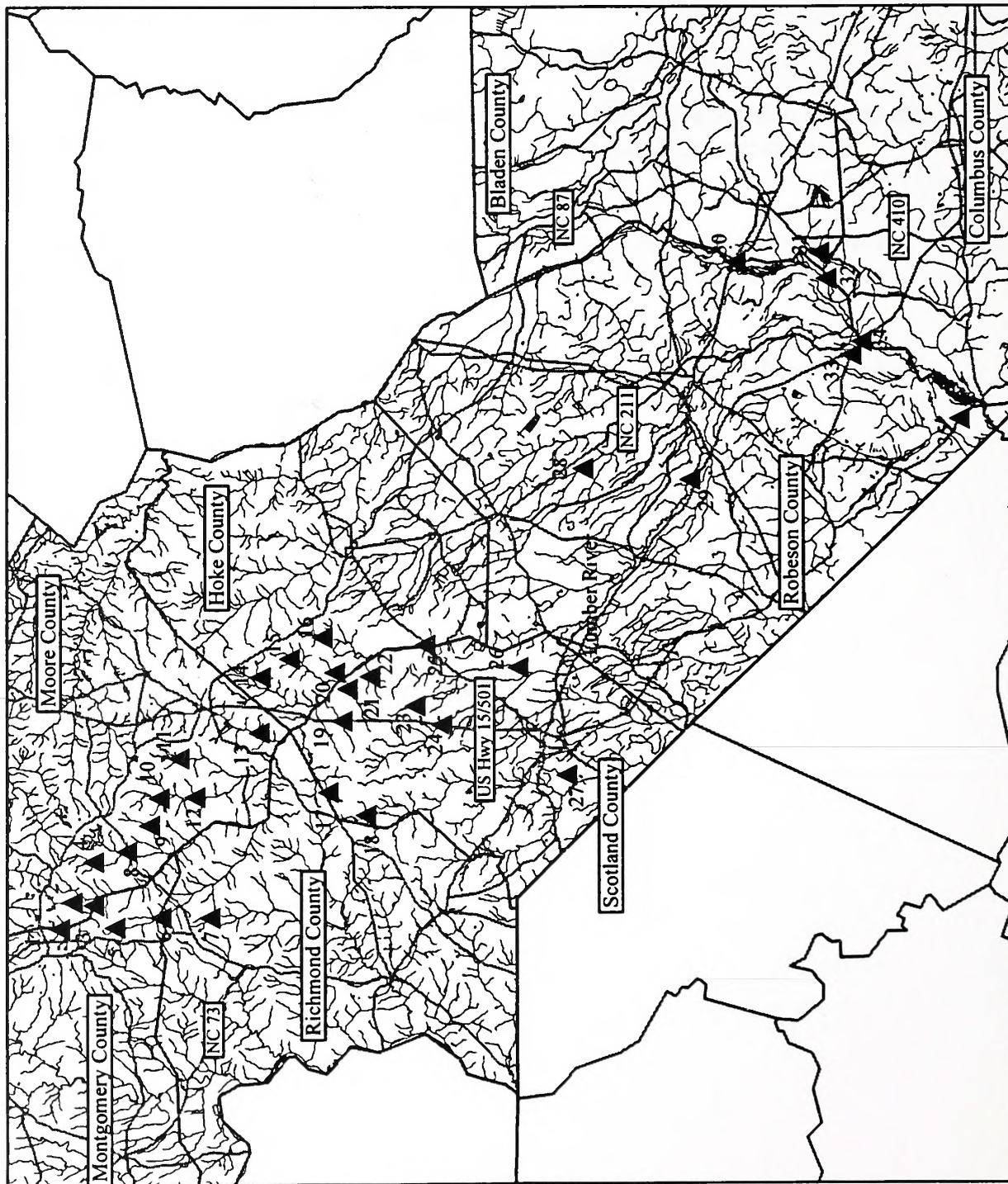
*Procambarus (Ortmannicus) blandingii* (Harlan, 1830)

*Procambarus (Ortmannicus) pearsei* (Creaser, 1934)

Sandhills crayfish

# LUMBER RIVER BASIN CRAYFISH SPECIES INVENTORY

Figure 1.



Dot	Station	
1	970401.1	18 970417.4
2	970415.5	19 970417.1
3	970401.2	20 970416.1
4	970415.1	21 970417.2
5	970401.4	22 970417.3
6	970401.3	23 970515.1
7	970415.3	24 960718.3
8	970415.4	25 960718.2
9	970402.4	26 970515.2
10	970402.2	27 970515.3
11	970402.1	28 970722.1
12	970402.3	29 960716.4
13	970415.2	30 970612.2
14	970416.5	31 970709.1
15	970416.3	32 960717.5
16	970416.2	33 960716.3
17	970723.1	34 960717.1
		35 960716.2



Table 2. Crayfish found in the Lumber River Basin

Station No.	Scientific Name	Waterway	Common Locality	County	Date	Number/Sex	Identified By
960716.2	<i>Procambarus (O.) blandingii</i>	Roadside ditch	SR 2256	Robeson	16 July 1996	IMII, 3F	M.E. Savacool
960716.3	<i>Procambarus (O.) blandingii</i>	Roadside ditch	NC 130	Robeson	16 July 1996	IMI	J.E. Cooper, M.E. Savacool
960716.3	<i>Procambarus (O.) pearsei</i>	Roadside ditch	NC 130	Robeson	16 July 1996	2MII, 2jM, 7F, 1jF	J.E. Cooper, M.E. Savacool
960716.4	<i>Procambarus (O.) acutus acutus</i>	Lumber River	SR 1550	Robeson	16 July 1996	IF	M.E. Savacool
960717.1	<i>Procambarus (O.) blandingii</i>	Lumber River	US 74, Wildlife Boat Ramp	Colum./Rob. line	17 July 1996	2MII	J.E. Cooper, M.E. Savacool
960717.5	<i>Procambarus (O.) blandingii</i>	Big Swamp	SR 1002 (boat ramp)	Robeson	17 July 1996	6MII, 3F	M.E. Savacool
960718.2	<i>Procambarus (O.) blandingii</i>	Lumber River	US 401 to SR 1404	Hoke/Scot. line	18 July 1996	IMI, 2MII	J.E. Cooper, M.E. Savacool
960718.3	<i>Procambarus (O.) blandingii</i>	Juniper Creek	US 15/501	Scotland	18 July 1996	IMI, IMII	J.E. Cooper, M.E. Savacool
970401.1	<i>Cambarus (P.) sp. C</i>	Drowning Creek	SR 1514	Mont./Moore line	1 April 1997	IMII	M.E. Savacool
970401.2	<i>Cambarus (P.) sp. C</i>	Drowning Creek	SR 1571	Mont./Moore line	1 April 1997	1jF	M.E. Savacool
970401.3	<i>Procambarus (O.) blandingii</i>	Naked Creek	SR 1527	Mont./Rich. line	1 April 1997	3MII, 1jM, 1jF	M.E. Savacool
970401.4	<i>Procambarus (O.) acutus acutus</i>	Naked Creek	SR 1524	Montgomery	1 April 1997	1jM	M.E. Savacool
970402.1	<i>Cambarus (P.) sp. C</i>	Horse Creek	SR 1115	Moore	2 April 1997	IMI	M.E. Savacool
970402.1	<i>Procambarus (O.) blandingii</i>	Horse Creek	SR 1115	Moore	2 April 1997	3F	M.E. Savacool
970402.2	<i>Cambarus (P.) sp. C</i>	Deep Creek	SR 1122	Moore	2 April 1997	2F	M.E. Savacool
970402.3	<i>Cambarus (P.) sp. C</i>	Deep Creek	SR 1112	Moore	2 April 1997	IMII, 4jM, 2jF	M.E. Savacool
970402.3	<i>Procambarus (O.) blandingii</i>	Deep Creek	SR 1112	Moore	2 April 1997	IMI	M.E. Savacool
970402.4	<i>Cambarus (P.) sp. C</i>	trib. to Drowning Creek	SR 1122	Moore	2 April 1997	IF	M.E. Savacool
970415.1	<i>Cambarus (P.) sp. C</i>	trib. to Drowning Creek	SR 1129	Moore	15 April 1997	IMII, 4jM, 2F, 2jF	M.E. Savacool
970415.2	<i>Procambarus (O.) acutus acutus</i>	trib. to Drowning Creek	SR 1100	Moore	15 April 1997	IMI, IMII, 1jM, 3F, 2jF	M.E. Savacool
970415.3	<i>Procambarus (O.) blandingii</i>	trib. to Drowning Creek	SR 1458	Richmond	15 April 1997	3jF	M.E. Savacool
970415.4	<i>Procambarus (O.) blandingii</i>	trib. to Drowning Cr.	NC 73	Moore	15 April 1997	IMII	M.E. Savacool
970415.4	<i>Cambarus (P.) sp. C</i>	trib. to Drowning Cr.	NC 73	Moore	15 April 1997	2MII, 1F	M.E. Savacool
970415.5	<i>Cambarus (P.) sp. C</i>	trib. to Drowning Creek	SR 1139	Moore	15 April 1997	2jM, 1jF	M.E. Savacool
970416.1	<i>Cambarus (P.) sp. C</i>	Little Creek	SR 1216	Hoke	16 April 1997	IMI, IMII, 3F, 3jF	M.E. Savacool
970416.2	<i>Procambarus (O.) acutus acutus</i>	Buffalo Creek	SR 1214	Hoke	16 April 1997	IMI, 3MII, 1jM, 2F	M.E. Savacool
970416.3	<i>Procambarus (O.) acutus acutus</i>	Mountain Creek	SR 1219	Hoke	16 April 1997	IMII, 2F	M.E. Savacool
970416.3	<i>Cambarus (P.) sp. C</i>	Mountain Creek	SR 1219	Hoke	16 April 1997	1jM, 1F	M.E. Savacool
970416.5	<i>Cambarus (P.) sp. C</i>	trib. to Quewhiffle Creek	SR 1214	Hoke	16 April 1997	3MII, 1F	M.E. Savacool
970416.5	<i>Procambarus (O.) blandingii</i>	trib. to Quewhiffle Creek	SR 1214	Hoke	16 April 1997	1jM, 2jF	M.E. Savacool
970417.1	<i>Cambarus (P.) sp. C</i>	trib. to Drowning Creek	NC 15/501	Hoke	17 April 1997	3jM, 3jF	M.E. Savacool
970417.2	<i>Cambarus (P.) sp. C</i>	trib. to Drowning Creek	SR 1400	Scotland	17 April 1997	2MII	M.E. Savacool
970417.3	<i>Procambarus (O.) blandingii</i>	trib. to Drowning Creek	SR 1412	Scotland	17 April 1997	IMII, 4F	M.E. Savacool
970417.4	<i>Procambarus (O.) blandingii</i>	trib. to Drowning Creek	SR 1001	Scotland	17 April 1997	2jM, 2jF	M.E. Savacool
970417.4	<i>Cambarus (P.) sp. C</i>	trib. to Gum Swamp Creek	SR 1001	Scotland	17 April 1997	2MII, 3jM, 1F, 1jF	M.E. Savacool
970515.1	<i>Procambarus (O.) blandingii</i>	trib. to Gum Swamp Creek	SR 1412	Scotland	15 May 1997	1jM	M.E. Savacool
970515.2	<i>Procambarus (O.) blandingii</i>	Big Shoe Heel Creek	SR 1433	Scotland	15 May 1997	IMII	M.E. Savacool

Table 2. Crayfish found in the Lumber River Basin (cont.)

<u>Station No.</u>	<u>Scientific Name</u>	<u>Waterway</u>	<u>Common Locality</u>	<u>County</u>	<u>Date</u>	<u>Number/Sex</u>	<u>Identified By</u>
970515.3	<i>Procambarus (O.) blandingii</i>	trib. to Gum Swamp Creek	SR 1108	Scotland	15 May 1997	1M1, 1MII, 1jM, 2F	M.E. Savacool
970612.2	<i>Procambarus (O.) blandingii</i>	Big Swamp	NC 211	Bladen/Rob. line	12 June 1997	1MII, 2F	M.E. Savacool
970709.1	<i>Procambarus (O.) acutus acutus</i>	Slender Branch	NC 242	Bladen	9 July 1997	1F	J.E. Cooper, G.B. Mottesi
970722.1	<i>Procambarus (O.) blandingii</i>	Richland Swamp	SR 1318	Robeson	22 July 1997	1MII, 1jM, 2jF	J.E. Cooper, G.B. Mottesi
970723.1	<i>Procambarus (O.) pearsei</i>	Muddy Creek	SR 1328, Sandhills Game.	Scotland	23 July 1997	1F	J.E. Cooper, G.B. Mottesi



# **Freshwater Fishes**

## **Introduction**

Approximately 790 fish species are believed to occur in the freshwaters of the United States and Canada (Page & Burr 1991). More than 225 species can be found in North Carolina (Menhinick 1991). This unusually rich and variable fish fauna is due to a great diversity of habitats found within the state and to different zoogeographic distribution patterns of various species. Many game species, several bait and forage species, and at least one aquarium species have become established in the waters of North Carolina (Menhinick 1991).

Unfortunately, almost one quarter of the fish occurring in North Carolina are state listed as Endangered, Threatened, or Special Concern species. This is of concern since fish are important components of aquatic ecosystems; they are indicators of water quality; and many species are a source of recreation for the state's citizens. Therefore, it is important that we determine their status/distributions and apply proper conservation techniques where necessary.

## **Methods**

Study areas for this project included the aquatic habitats associated with the Lumber River Basin (Fig. 1, Introduction Section). Most habitats of the headwaters of the Lumber River Basin can be described as riffle/run with slow to fast flow. Pools of different sizes with slow flow were also present. Substrate included combinations of silt/sand/gravel/woody debris and leaf litter. Aquatic vegetation and organic debris were also present. The river habitat was slow to fast flow pools, with a silt/sand/gravel/woody debris and leaf litter substrate. Certain tributaries of the river were swampy with abundant aquatic vegetation. Throughout the basin there was a good hardwood/pine buffer with occasional cypress. The pH in this basin ranged from 4.3 - 7.2.

Fish were collected throughout the Lumber River Basin (Fig. 1). Collecting techniques included the use of a 6' x 10' minnow seine and dip nets. Different techniques of seining, such as kicking, and setting and dragging, were utilized according to the habitat. Specimens were fixed in 10% formalin and preserved in 70% ethanol. Specimens not collected were returned unharmed.

The following sources were used as identification tools: Jenkins (1995), Menhinick (1991), Page (1983), Page and Burr (1991), and Rohde, et al. (1994). Some identifications were verified using specimens from the collection of the NC State Museum of Natural Sciences. With the acquisition of more information, identifications may be subject to change.

## Results and Discussion

Figure 1 details the localities of the forty-seven stations where fish were found. Forty species of fish representing thirteen families were found within the Lumber River Basin (Table 1).

Many of the species that we found in the Lumber River Basin, were also found by Keith Ashley (Fisheries Biologist, NCWRC) who lead a survey of the Lumber River from 1994-1997. His efforts involved the use of a boat shocker, which allowed access to the species that prefer the deeper and difficult to reach areas of the river itself. Following is a list of other species which his survey discovered.

American eel	Eastern silvery minnow	Striped bass
Black crappie	Flat bullhead	Striped mullet
Black bullhead	Flathead catfish	Summer flounder
Blue catfish	Gizzard shad	Tailight shiner
Blueback herring	Hickory shad	White shad
Bowfin	Longnose gar	White catfish
Channel cat	Redear sunfish	
Common carp	Snail bullhead	

Fish species diversity and abundance are good within the Lumber River Basin (Table 2). Three state listed species of Special Concern were detected by our survey, *Cyprinella zanema* (Jordan & Brayton, 1878), the Santee chub, *Semotilus lumbee* Snelson & Suttkus, 1978, the Sandhills chub, and *Etheostoma mariae* (Fowler, 1947), the Pinewoods darter. *Cyprinella zanema* was found at one site of the Lumber River proper. *Etheostoma mariae* was found among aquatic vegetation in the headwater streams of the basin, while *Semotilus lumbee* was found throughout the basin. Both *Semotilus lumbee* and *Etheostoma mariae* are endemic to the Carolina Sandhills area (Rohde & Arnt 1991).

## Resources

Etnier, D. A and W. C. Starnes. 1993. *The Fishes of Tennessee*. The University of Tennessee Press. Knoxville, TN. 681 pp.

Jenkins, B. 1995. Unpublished key to the Family Catostomidae.

Jenkins, R. E. and N. M. Burkhead. 1994. *Freshwater Fishes of Virginia*. American Fisheries Society. Bethesda, MA. 1079 pp.

Lee, D. S., C. R. Gilbert, C. H. Hocutt, R. E. Jenkins, D. E. McAllister, and J. R. Stauffer, Jr. 1980. *Atlas of North American Freshwater Fishes*. North Carolina Biological Survey. Raleigh, NC. 867 pp.



- Menhinick, E. F. 1991. *The Freshwater Fishes of North Carolina*. North Carolina Wildlife Resources Commission. Raleigh, NC. 227 pp.
- Page, L. M. 1983. *Handbook of Darters*. TFH Publications, Inc. Ltd. Neptune City, NJ. 271 pp.
- Page, L. M. and B. M. Burr. 1991. *A Field Guide to Freshwater Fishes*. Peterson Field Guide Series. Houghton Mifflin Company. Boston, MA. 432 pp.
- Rohde, F. C., R. G. Arndt, D. G. Lindquist, and J. F. Parnell. 1994. *Freshwater Fishes of the Carolinas, Virginia, Maryland, & Delaware*. The University of North Carolina Press. Chapel Hill, NC. 222 pp.
- Rohde, F. C. and R. G. Arnt. 1991. Distribution and status of the sandhills chub, *Semotilus lumbee*, and the pinewoods darter, *Etheostoma mariae*. *The Journal of the Elisha Mitchell Scientific Society*. 107(2). 61-70.

Table 1. Fish found in the Lumber River Basin

Cyprinidae

<i>Cyprinella zanema</i> (Jordan & Brayton, 1878)	Santee chub
<i>Nocomis leptocephalus</i> (Girard, 1856)	Bluehead chub
<i>Notemigonus crysoleucas</i> (Mitchill, 1814)	Golden shiner
<i>Notropis chalybaeus</i> (Cope, 1869)	Ironcolor shiner
<i>Notropis chiliticus</i> (Cope, 1870)	Redlip shiner
<i>Notropis cummingsae</i> Myers, 1925	Dusky shiner
<i>Notropis petersoni</i> Fowler, 1942	Coastal shiner
<i>Semotilus lumbee</i> Snelson & Suttkus, 1978	Sandhills chub

Catostomidae

<i>Erimyzon oblongus</i> (Mitchill, 1814)	Creek chubsucker
<i>Erimyzon sucetta</i> (Lacépède, 1803)	Lake chubsucker
<i>Minytrema melanops</i> (Rafinesque, 1820)	Spotted sucker

Ictaluridae

<i>Ameiurus natalis</i> (Lesueur, 1819)	Yellow bullhead
<i>Noturus gyrinus</i> (Mitchill, 1817)	Tadpole madtom
<i>Noturus insignis</i> (Richardson, 1836)	Marginated madtom

Esocidae

<i>Esox americanus</i> Gmelin, 1788	Redfin pickerel
<i>Esox niger</i> Lesueur, 1818	Chain pickerel

Umbridae

<i>Umbra pygmaea</i> (Dekay, 1842)	Eastern mudminnow
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Aphredoderidae

<i>Aphredoderus sayanus</i> (Gilliams, 1824)	Pirate perch
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Amblyopsidae

<i>Chologaster cornuta</i> Agassiz, 1853	Swampfish
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Atherinidae

<i>Labidesthes sicculus</i> (Cope, 1865)	Brook silverside
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Fundulidae

<i>Fundulus lineolatus</i> (Agassiz, 1854)	Lined topminnow
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Poeciliidae

<i>Gambusia holbrooki</i> Girard, 1859	Eastern mosquitofish
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Elassomatidae

<i>Elassoma zonatum</i> Jordan, 1877	Banded pygmy sunfish
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Centrarchidae

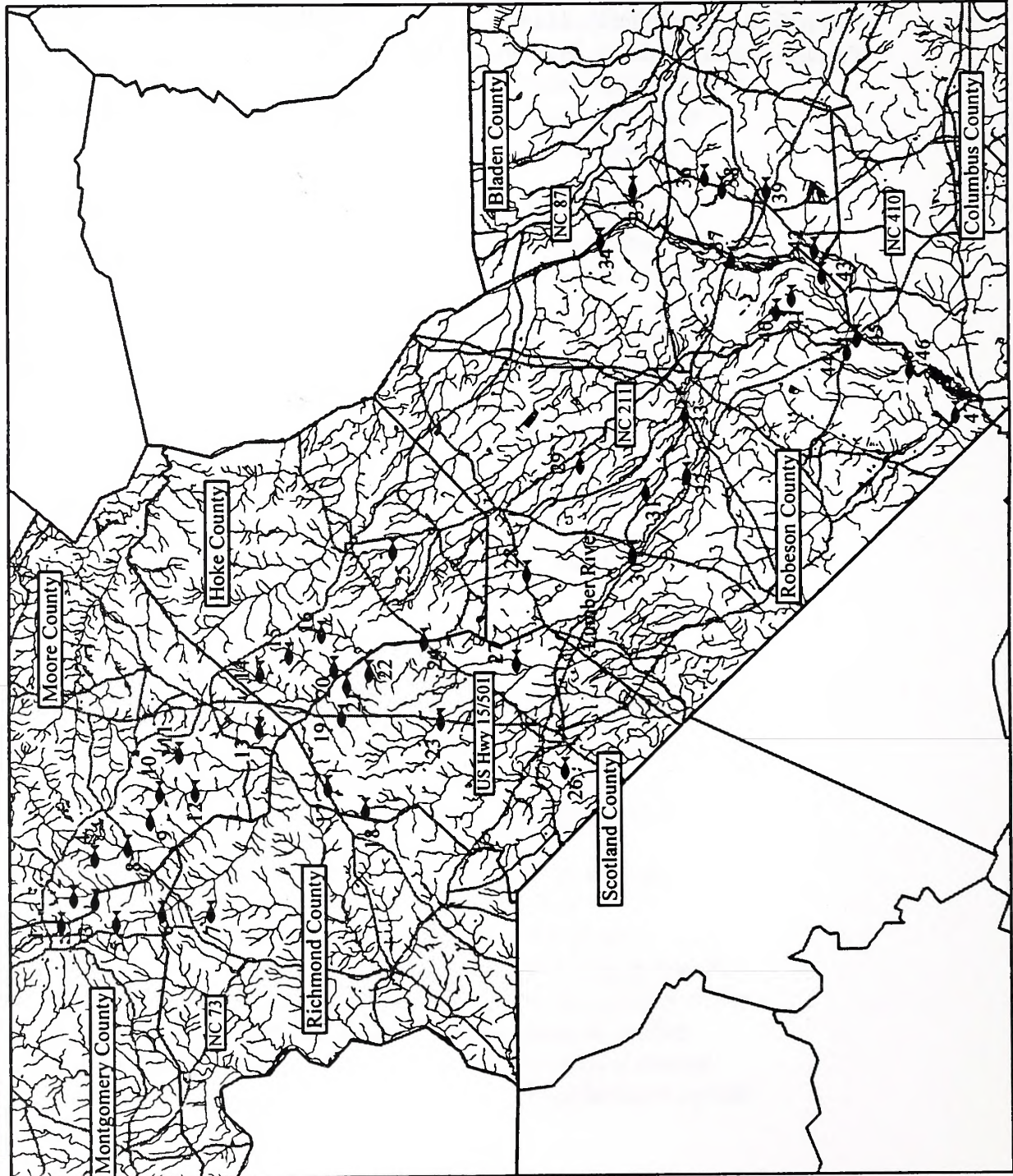
<i>Acantharchus pomotis</i> (Bairs, 1855)	Mud sunfish
<i>Centrarchus macropterus</i> (Lacépède, 1801)	Flier
<i>Chaenobryttus gulosus</i> (Cuvier, 1829)	Warmouth
<i>Enneacanthus chaetodon</i> (Baird, 1855)	Blackbanded sunfish
<i>Enneacanthus gloriosus</i> (Holbrook, 1855)	Bluespotted sunfish
<i>Enneacanthus obesus</i> (Girard, 1854)	Banded sunfish
<i>Lepomis auritus</i> (Linnaeus, 1758)	Redbreast sunfish
<i>Lepomis gibbosus</i> (Linnaeus, 1758)	Pumpkinseed sunfish



Table 1. Fish found in the Lumber River Basin (cont.)

<i>Lepomis macrochirus</i> Rafinesque, 1819	Bluegill sunfish
<i>Lepomis marginatus</i> (Holbrook, 1855)	Dollar sunfish
<i>Lepomis punctatus</i> (Valenciennes, 1831)	Spotted sunfish
<i>Micropterus salmoides</i> (Lacepède, 1802)	Largemouth bass
Percidae	
<i>Etheostoma mariae</i> (Fowler, 1947)	Pinewoods darter
<i>Etheostoma olmsted</i> Storer, 1842	Tessellated darter
<i>Etheostoma serrifer</i> (Hubbs & Cannon, 1935)	Sawcheek darter
<i>Perca flavescens</i> (Mitchill, 1814)	Yellow perch
<i>Percina crassa</i> (Jordan & Brayton, 1878)	Piedmont darter

# LUMBER RIVER BASIN FISH SPECIES INVENTORY



Dot	Station	
1	970401.1	24 960718.2
2	970415.5	25 970722.2
3	970401.2	26 970515.3
4	970415.1	27 970515.2
5	970401.4	28 970721.1
6	970401.3	29 970722.1
7	970415.3	30 960718.1
8	970415.4	31 970721.2
9	970402.4	32 960716.4
10	970402.2	33 960717.7
11	970402.1	34 970612.3
12	970402.3	35 970709.4
13	970415.2	36 970709.2
14	970416.5	37 970612.2
15	970416.3	38 970709.3
16	970416.2	39 970612.1
17	970723.1	40 960717.3
18	970417.4	41 960717.2
19	970417.1	42 970709.1
20	970416.1	43 960717.5
21	970417.2	44 960716.3
22	970417.3	45 960717.1
23	960718.3	46 960716.1
		47 960716.2

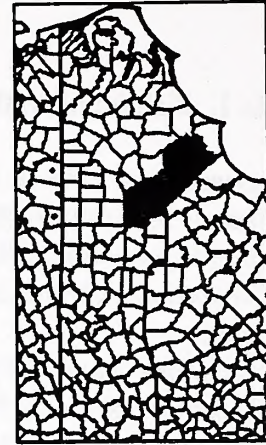


Figure 1.



Table 2. Fish found in the Lumber River Basin

<u>Station No.</u>	<u>Scientific Name</u>	<u>Waterway</u>	<u>Common Locality</u>	<u>County</u>	<u>Date</u>	<u>No.</u>	<u>Identified By</u>
960716.1	<i>Etheostoma olmstedi</i>	Lumber River	SR 2246/2247, LRSP	Colum./Rob. line	16 July 1996	6	G.B. Mottesi
960716.1	<i>Micropterus salmoides</i>	Lumber River	SR 2246/2247, LRSP	Colum./Rob. line	16 July 1996	1	G.B. Mottesi
960716.1	<i>Notropis petersoni</i>	Lumber River	SR 2246/2247, LRSP	Colum./Rob. line	16 July 1996	2	G.B. Mottesi
960716.2	<i>Acantharchus pomotis</i>	Roadside ditch	SR 2256	Robeson	16 July 1996	1	G.B. Mottesi
960716.2	<i>Ameiurus natalis</i>	Roadside ditch	SR 2256	Robeson	16 July 1996	4	G.B. Mottesi
960716.2	<i>Aphredoderus sayanus</i>	Roadside ditch	SR 2256	Robeson	16 July 1996	3	G.B. Mottesi
960716.2	<i>Centrarchus macropterus</i>	Roadside ditch	SR 2256	Robeson	16 July 1996	2	G.B. Mottesi
960716.2	<i>Chaenobryttus gulosus</i>	Roadside ditch	SR 2256	Robeson	16 July 1996	1	G.B. Mottesi
960716.2	<i>Chologaster cornuta</i>	Roadside ditch	SR 2256	Robeson	16 July 1996	4	G.B. Mottesi
960716.2	<i>Elassoma zonatum</i>	Roadside ditch	SR 2256	Robeson	16 July 1996	2	G.B. Mottesi
960716.2	<i>Enneacanthus gloriosus</i>	Roadside ditch	SR 2256	Robeson	16 July 1996	2	G.B. Mottesi
960716.2	<i>Esox americanus</i>	Roadside ditch	SR 2256	Robeson	16 July 1996	3	G.B. Mottesi
960716.2	<i>Gambusia holbrooki</i>	Roadside ditch	SR 2256	Robeson	16 July 1996	8	G.B. Mottesi
960716.2	<i>Notropis cummingsae</i>	Roadside ditch	SR 2256	Robeson	16 July 1996	20	G.B. Mottesi
960716.2	<i>Umbra pygmaea</i>	Roadside ditch	SR 2256	Robeson	16 July 1996	1	G.B. Mottesi
960716.3	<i>Acantharchus pomotis</i>	Roadside ditch	NC 130	Robeson	16 July 1996	4	G.B. Mottesi
960716.3	<i>Umbra pygmaea</i>	Roadside ditch	NC 130	Robeson	16 July 1996	11	G.B. Mottesi
960716.4	<i>Etheostoma olmstedi</i>	Lumber River	SR 1550	Robeson	16 July 1996	3	G.B. Mottesi
960716.4	<i>Labidesthes sicculus</i>	Lumber River	SR 1550	Robeson	16 July 1996	1	G.B. Mottesi
960716.4	<i>Lepomis auritus</i>	Lumber River	SR 1550	Robeson	16 July 1996	4	G.B. Mottesi
960716.4	<i>Lepomis macrochirus</i>	Lumber River	SR 1550	Robeson	16 July 1996	2	G.B. Mottesi
960716.4	<i>Notropis petersoni</i>	Lumber River	SR 1550	Robeson	16 July 1996	9	G.B. Mottesi
960716.4	<i>Perca flavescens</i>	Lumber River	SR 1550	Robeson	16 July 1996	2	G.B. Mottesi
960717.1	<i>Esox americanus</i>	Lumber River	SR 1550	Robeson	16 July 1996	2	G.B. Mottesi
960717.1	<i>Etheostoma olmstedi</i>	Lumber River	US 74, Wildlife Boat Ramp	Colum./Rob. line	17 July 1996	1	G.B. Mottesi
960717.1	<i>Etheostoma serrifer</i>	Lumber River	US 74, Wildlife Boat Ramp	Colum./Rob. line	17 July 1996	1	G.B. Mottesi
960717.1	<i>Gambusia holbrooki</i>	Lumber River	US 74, Wildlife Boat Ramp	Colum./Rob. line	17 July 1996	1	G.B. Mottesi
960717.1	<i>Lepomis auritus</i>	Lumber River	US 74, Wildlife Boat Ramp	Colum./Rob. line	17 July 1996	6	G.B. Mottesi
960717.1	<i>Lepomis marginatus</i>	Lumber River	US 74, Wildlife Boat Ramp	Colum./Rob. line	17 July 1996	2	G.B. Mottesi
960717.1	<i>Lepomis punctatus</i>	Lumber River	US 74, Wildlife Boat Ramp	Colum./Rob. line	17 July 1996	2	G.B. Mottesi
960717.1	<i>Notropis petersoni</i>	Lumber River	US 74, Wildlife Boat Ramp	Colum./Rob. line	17 July 1996	3	G.B. Mottesi
960717.1	<i>Fundulus lineolatus</i>	Roadside ditch	US 74, Wildlife Boat Ramp	Colum./Rob. line	17 July 1996	19	G.B. Mottesi
960717.2	<i>Gambusia holbrooki</i>	Roadside ditch	SR 2121	Robeson	17 July 1996	8	G.B. Mottesi
960717.2	<i>Acantharchus pomotis</i>	Roadside ditch	SR 2121	Robeson	17 July 1996	2	G.B. Mottesi
960717.3	<i>Gambusia holbrooki</i>	Roadside ditch	SR 2123	Robeson	17 July 1996	2	G.B. Mottesi
960717.3	<i>Umbra pygmaea</i>	Roadside ditch	SR 2123	Robeson	17 July 1996	4	G.B. Mottesi
960717.3		Roadside ditch	SR 2123	Robeson	17 July 1996	2	G.B. Mottesi

Table 2. Fish found in the Lumber River Basin (cont.)

Station No.	Scientific Name	Waterway	Common Locality	County	Date	No.	Identified By
960717.5	<i>Aphredoderus sayanus</i>	Big Swamp	SR 1002 (boat ramp)	Robeson	17 July 1996	3	G.B. Mottesi
960717.5	<i>Emneacanthus chaetodon</i>	Big Swamp	SR 1002 (boat ramp)	Robeson	17 July 1996	1	G.B. Mottesi
960717.5	<i>Emneacanthus gloriosus</i>	Big Swamp	SR 1002 (boat ramp)	Robeson	17 July 1996	2	G.B. Mottesi
960717.5	<i>Erimyzon oblongus</i>	Big Swamp	SR 1002 (boat ramp)	Robeson	17 July 1996	7	G.B. Mottesi
960717.5	<i>Esox americanus</i>	Big Swamp	SR 1002 (boat ramp)	Robeson	17 July 1996	4	G.B. Mottesi
960717.5	<i>Etheostoma olmstedi</i>	Big Swamp	SR 1002 (boat ramp)	Robeson	17 July 1996	1	G.B. Mottesi
960717.5	<i>Etheostoma serrafer</i>	Big Swamp	SR 1002 (boat ramp)	Robeson	17 July 1996	11	G.B. Mottesi
960717.5	<i>Gambusia holbrooki</i>	Big Swamp	SR 1002 (boat ramp)	Robeson	17 July 1996	6	G.B. Mottesi
960717.5	<i>Labidesthes sicculus</i>	Big Swamp	SR 1002 (boat ramp)	Robeson	17 July 1996	9	G.B. Mottesi
960717.5	<i>Lepomis marginatus</i>	Big Swamp	SR 1002 (boat ramp)	Robeson	17 July 1996	11	G.B. Mottesi
960717.5	<i>Lepomis punctatus</i>	Big Swamp	SR 1002 (boat ramp)	Robeson	17 July 1996	1	G.B. Mottesi
960717.5	<i>Micropterus salmoides</i>	Big Swamp	SR 1002 (boat ramp)	Robeson	17 July 1996	6	G.B. Mottesi
960717.5	<i>Umbra pygmaea</i>	Big Swamp	SR 1002 (boat ramp)	Robeson	17 July 1996	1	G.B. Mottesi
960717.7	<i>Ameiurus natalis</i>	Lumber River	SR 1002 (boat ramp)	Robeson	17 July 1996	1	G.B. Mottesi
960717.7	<i>Esox americanus</i>	Lumber River	NC 72 (boat ramp)	Robeson	17 July 1996	2	G.B. Mottesi
960717.7	<i>Etheostoma olmstedi</i>	Lumber River	NC 72 (boat ramp)	Robeson	17 July 1996	1	G.B. Mottesi
960717.7	<i>Gambusia holbrooki</i>	Lumber River	NC 72 (boat ramp)	Robeson	17 July 1996	1	G.B. Mottesi
960717.7	<i>Lepomis auriatus</i>	Lumber River	NC 72 (boat ramp)	Robeson	17 July 1996	2	G.B. Mottesi
960717.7	<i>Lepomis gibbosus</i>	Lumber River	NC 72 (boat ramp)	Robeson	17 July 1996	1	G.B. Mottesi
960717.7	<i>Lepomis macrochirus</i>	Lumber River	NC 72 (boat ramp)	Robeson	17 July 1996	1	G.B. Mottesi
960717.7	<i>Lepomis marginatus</i>	Lumber River	NC 72 (boat ramp)	Robeson	17 July 1996	1	G.B. Mottesi
960717.7	<i>Micropterus salmoides</i>	Lumber River	NC 72 (boat ramp)	Robeson	17 July 1996	2	G.B. Mottesi
960718.1	<i>Gambusia holbrooki</i>	Lumber River	NC 710	Robeson	17 July 1996	1	G.B. Mottesi
960718.2	<i>Cyprinella zanema</i>	Lumber River	US 401 to SR 1404	Robeson	18 July 1996	n/a	G.B. Mottesi
960718.2	<i>Esox americanus</i>	Lumber River	US 401 to SR 1404	Hoke/Scot.line	18 July 1996	2	G.B. Mottesi
960718.2	<i>Etheostoma olmstedi</i>	Lumber River	US 401 to SR 1404	Hoke/Scot.line	18 July 1996	1	G.B. Mottesi
960718.2	<i>Minytrema melanops</i>	Lumber River	US 401 to SR 1404	Hoke/Scot.line	18 July 1996	7	G.B. Mottesi
960718.2	<i>Notropis cummingsae</i>	Lumber River	US 401 to SR 1404	Hoke/Scot.line	18 July 1996	6	G.B. Mottesi
960718.2	<i>Notropis petersoni</i>	Lumber River	US 401 to SR 1404	Hoke/Scot.line	18 July 1996	5	G.B. Mottesi
960718.2	<i>Percina crassa</i>	Lumber River	US 401 to SR 1404	Hoke/Scot.line	18 July 1996	11	G.B. Mottesi
960718.3	<i>Emneacanthus gloriosus</i>	Juniper Creek	US 15/501	Scotland	18 July 1996	2	G.B. Mottesi
960718.3	<i>Esox americanus</i>	Juniper Creek	US 15/501	Scotland	18 July 1996	1	G.B. Mottesi
960718.3	<i>Etheostoma mariae</i>	Juniper Creek	US 15/501	Scotland	18 July 1996	1	G.B. Mottesi
960718.3	<i>Etheostoma olmstedi</i>	Juniper Creek	US 15/501	Scotland	18 July 1996	2	G.B. Mottesi
960718.3	<i>Notropis cummingsae</i>	Juniper Creek	US 15/501	Scotland	18 July 1996	12	G.B. Mottesi
960718.3	<i>Noturus insignis</i>	Juniper Creek	US 15/501	Scotland	18 July 1996	1	G.B. Mottesi



Table 2. Fish found in the Lumber River Basin (cont.)

Station No.	Scientific Name	Waterway	Common Locality	County	Date	No.	Identified By
960718.3	<i>Semotilus lumbee</i>	Juniper Creek	US 15/501	Scotland	18 July 1996	1	G.B. Mottesi
970401.1	<i>Etheostoma olmstedi</i>	Drowning Creek	SR 1514	Mont./Moore line	1 April 1997	1	G.B. Mottesi
970401.1	<i>Gambusia holbrooki</i>	Drowning Creek	SR 1514	Mont./Moore line	1 April 1997	1	G.B. Mottesi
970401.1	<i>Lepomis macrochirus</i>	Drowning Creek	SR 1514	Mont./Moore line	1 April 1997	1	G.B. Mottesi
970401.1	<i>Semotilus lumbee</i>	Drowning Creek	SR 1514	Mont./Moore line	1 April 1997	1	G.B. Mottesi
970401.2	<i>Etheostoma olmstedi</i>	Drowning Creek	SR 1571	Mont./Moore line	1 April 1997	2	G.B. Mottesi
970401.2	<i>Nocomis leptoccephalus</i>	Drowning Creek	SR 1571	Mont./Moore line	1 April 1997	2	G.B. Mottesi
970401.2	<i>Notropis chiliticus</i>	Drowning Creek	SR 1571	Mont./Moore line	1 April 1997	21	G.B. Mottesi
970401.2	<i>Semotilus lumbee</i>	Drowning Creek	SR 1571	Mont./Moore line	1 April 1997	1	G.B. Mottesi
970401.3	<i>Etheostoma mariae</i>	Naked Creek	SR 1527	Mont./Rich. line	1 April 1997	5	G.B. Mottesi
970401.3	<i>Etheostoma olmstedi</i>	Naked Creek	SR 1527	Mont./Rich. line	1 April 1997	1	G.B. Mottesi
970401.3	<i>Nocomis leptoccephalus</i>	Naked Creek	SR 1527	Mont./Rich. line	1 April 1997	1	G.B. Mottesi
970401.3	<i>Notropis cummingsae</i>	Naked Creek	SR 1527	Mont./Rich. line	1 April 1997	2	G.B. Mottesi
970401.4	<i>Etheostoma serrifer</i>	Naked Creek	SR 1524	Montgomery	1 April 1997	6	G.B. Mottesi
970402.1	<i>Acantharchus pomotis</i>	Horse Creek	SR 1115	Moore	2 April 1997	1	G.B. Mottesi
970402.1	<i>Aphredoderus sayanus</i>	Horse Creek	SR 1115	Moore	2 April 1997	1	G.B. Mottesi
970402.1	<i>Elassoma zonatum</i>	Horse Creek	SR 1115	Moore	2 April 1997	1	G.B. Mottesi
970402.1	<i>Esox americanus</i>	Horse Creek	SR 1115	Moore	2 April 1997	1	G.B. Mottesi
970402.1	<i>Etheostoma mariae</i>	Horse Creek	SR 1115	Moore	2 April 1997	3	G.B. Mottesi
970402.1	<i>Lepomis macrochirus</i>	Horse Creek	SR 1115	Moore	2 April 1997	2	G.B. Mottesi
970402.1	<i>Noturus insignis</i>	Horse Creek	SR 1115	Moore	2 April 1997	3	G.B. Mottesi
970402.2	<i>Elassoma zonatum</i>	Deep Creek	SR 1122	Moore	2 April 1997	3	G.B. Mottesi
970402.2	<i>Enneacanthus chaetodon</i>	Deep Creek	SR 1122	Moore	2 April 1997	5	G.B. Mottesi
970402.2	<i>Enneacanthus gloriosus</i>	Deep Creek	SR 1122	Moore	2 April 1997	2	G.B. Mottesi
970402.2	<i>Esox americanus</i>	Deep Creek	SR 1122	Moore	2 April 1997	2	G.B. Mottesi
970402.2	<i>Etheostoma mariae</i>	Deep Creek	SR 1122	Moore	2 April 1997	3	G.B. Mottesi
970402.2	<i>Etheostoma serrifer</i>	Deep Creek	SR 1122	Moore	2 April 1997	5	G.B. Mottesi
970402.2	<i>Fundulus lineolatus</i>	Deep Creek	SR 1122	Moore	2 April 1997	7	G.B. Mottesi
970402.2	<i>Notropis cummingsae</i>	Deep Creek	SR 1122	Moore	2 April 1997	14	G.B. Mottesi
970402.2	<i>Noturus gyrinus</i>	Deep Creek	SR 1122	Moore	2 April 1997	1	G.B. Mottesi
970402.3	<i>Esox americanus</i>	Deep Creek	SR 1112	Moore	2 April 1997	1	G.B. Mottesi
970402.3	<i>Etheostoma mariae</i>	Deep Creek	SR 1112	Moore	2 April 1997	4	G.B. Mottesi
970402.3	<i>Etheostoma olmstedi</i>	Deep Creek	SR 1112	Moore	2 April 1997	2	G.B. Mottesi
970402.3	<i>Noturus gyrinus</i>	Deep Creek	SR 1112	Moore	2 April 1997	1	G.B. Mottesi
970402.4	<i>Esox americanus</i>	trib. to Drowning Creek	SR 1122	Moore	2 April 1997	1	G.B. Mottesi
970415.1	<i>Chaenobryttus gulosus</i>	trib. to Drowning Creek	SR 1129	Moore	15 April 1997	1	G.B. Mottesi

Table 2. Fish found in the Lumber River Basin (cont.)

Station No.	Scientific Name	Waterway	Common Locality	County	Date	No.	Identified By
970415.1	<i>Etheostoma mariae</i>	trib. to Drowning Creek	SR 1129	Moore	15 April 1997	8	G.B. Mottesi
970415.1	<i>Etheostoma omstedti</i>	trib. to Drowning Creek	SR 1129	Moore	15 April 1997	6	G.B. Mottesi
970415.1	<i>Etheostoma serrifer</i>	trib. to Drowning Creek	SR 1129	Moore	15 April 1997	1	G.B. Mottesi
970415.1	<i>Semotilus lumbee</i>	trib. to Drowning Creek	SR 1129	Moore	15 April 1997	1	G.B. Mottesi
970415.2	<i>Chologaster cornuta</i>	trib. to Drowning Creek	SR 1100	Moore	15 April 1997	2	G.B. Mottesi
970415.2	<i>Umbra pygmaea</i>	trib. to Drowning Creek	SR 1100	Moore	15 April 1997	1	G.B. Mottesi
970415.3	<i>Aphredoderus sayanus</i>	trib. to Naked Creek	SR 1458	Richmond	15 April 1997	1	G.B. Mottesi
970415.3	<i>Esox americanus</i>	trib. to Naked Creek	SR 1458	Richmond	15 April 1997	3	G.B. Mottesi
970415.3	<i>Gambusia holbrooki</i>	trib. to Naked Creek	SR 1458	Richmond	15 April 1997	1	G.B. Mottesi
970415.3	<i>Lepomis macrochirus</i>	trib. to Naked Creek	SR 1458	Richmond	15 April 1997	3	G.B. Mottesi
970415.3	<i>Lepomis marginatus</i>	trib. to Naked Creek	SR 1458	Richmond	15 April 1997	3	G.B. Mottesi
970415.3	<i>Notropis cummingsae</i>	trib. to Naked Creek	SR 1458	Richmond	15 April 1997	3	G.B. Mottesi
970415.4	<i>Noturus insignis</i>	trib. to trib. to Drowning Cr.	SR 1458	Richmond	15 April 1997	4	G.B. Mottesi
970415.4	<i>Semotilus lumbee</i>	trib. to trib. to Drowning Cr.	NC 73	Moore	15 April 1997	2	G.B. Mottesi
970415.5	<i>Lepomis macrochirus</i>	trib. to Drowning Creek	NC 73	Moore	15 April 1997	1	G.B. Mottesi
970415.5	<i>Semotilus lumbee</i>	trib. to Drowning Creek	SR 1139	Moore	15 April 1997	1	G.B. Mottesi
970416.1	<i>Esox americanus</i>	trib. to Drowning Creek	SR 1139	Moore	15 April 1997	2	G.B. Mottesi
970416.1	<i>Semotilus lumbee</i>	Little Creek	SR 1216	Hoke	16 April 1997	2	G.B. Mottesi
970416.2	<i>Ameiurus natalis</i>	Buffalo Creek	SR 1216	Hoke	16 April 1997	2	G.B. Mottesi
970416.2	<i>Aphredoderus sayanus</i>	Buffalo Creek	SR 1214	Hoke	16 April 1997	1	G.B. Mottesi
970416.2	<i>Elassoma zonatum</i>	Buffalo Creek	SR 1214	Hoke	16 April 1997	1	G.B. Mottesi
970416.2	<i>Etheostoma serrifer</i>	Buffalo Creek	SR 1214	Hoke	16 April 1997	3	G.B. Mottesi
970416.2	<i>Gambusia holbrooki</i>	Buffalo Creek	SR 1214	Hoke	16 April 1997	1	G.B. Mottesi
970416.2	<i>Notropis cummingsae</i>	Buffalo Creek	SR 1214	Hoke	16 April 1997	4	G.B. Mottesi
970416.2	<i>Umbra pygmaea</i>	Buffalo Creek	SR 1214	Hoke	16 April 1997	2	G.B. Mottesi
970416.3	<i>Aphredoderus sayanus</i>	Mountain Creek	SR 1219	Hoke	16 April 1997	1	G.B. Mottesi
970416.3	<i>Esox americanus</i>	Mountain Creek	SR 1219	Hoke	16 April 1997	1	G.B. Mottesi
970416.3	<i>Etheostoma mariae</i>	Mountain Creek	SR 1219	Hoke	16 April 1997	1	G.B. Mottesi
970416.3	<i>Noturus gyrinus</i>	Mountain Creek	SR 1219	Hoke	16 April 1997	1	G.B. Mottesi
970416.5	<i>Elassoma zonatum</i>	trib. to Quewhiffle Creek	SR 1214	Hoke	16 April 1997	1	G.B. Mottesi
970416.5	<i>Esox americanus</i>	trib. to Quewhiffle Creek	SR 1214	Hoke	16 April 1997	1	G.B. Mottesi
970416.5	<i>Etheostoma mariae</i>	trib. to Quewhiffle Creek	SR 1214	Hoke	16 April 1997	4	G.B. Mottesi
970416.5	<i>Notropis cummingsae</i>	trib. to Quewhiffle Creek	SR 1214	Hoke	16 April 1997	4	G.B. Mottesi
970417.1	<i>Etheostoma mariae</i>	trib. to Drowning Creek	NC 15/501	Scotland	17 April 1997	4	G.B. Mottesi
970417.1	<i>Umbra pygmaea</i>	trib. to Drowning Creek	NC 15/501	Scotland	17 April 1997	1	G.B. Mottesi
970417.2	<i>Esox americanus</i>	trib. to Drowning Creek	SR 1400	Scotland	17 April 1997	1	G.B. Mottesi



Table 2. Fish found in the Lumber River Basin (cont.)

<u>Station No.</u>	<u>Scientific Name</u>	<u>Waterway</u>	<u>Common Locality</u>	<u>County</u>	<u>Date</u>	<u>No.</u>	<u>Identified By</u>
970417.2	<i>Etheostoma mariae</i>	trib. to Drowning Creek	SR 1400	Scotland	17 April 1997	1	G.B. Mottesi
970417.2	<i>Notropis cummingsae</i>	trib. to Drowning Creek	SR 1400	Scotland	17 April 1997	4	G.B. Mottesi
970417.3	<i>Aphredoderus sayanus</i>	trib. to Drowning Creek	SR 1412	Scotland	17 April 1997	1	G.B. Mottesi
970417.3	<i>Chaenobryttus gulosus</i>	trib. to Drowning Creek	SR 1412	Scotland	17 April 1997	1	G.B. Mottesi
970417.3	<i>Elassoma zonatum</i>	trib. to Drowning Creek	SR 1412	Scotland	17 April 1997	1	G.B. Mottesi
970417.3	<i>Enneacanthus gloriosus</i>	trib. to Drowning Creek	SR 1412	Scotland	17 April 1997	7	G.B. Mottesi
970417.3	<i>Etheostoma serrafer</i>	trib. to Drowning Creek	SR 1412	Scotland	17 April 1997	1	G.B. Mottesi
970417.3	<i>Notemigonus crysoleucas</i>	trib. to Drowning Creek	SR 1412	Scotland	17 April 1997	1	G.B. Mottesi
970417.3	<i>Notropis cummingsae</i>	trib. to Drowning Creek	SR 1412	Scotland	17 April 1997	12	G.B. Mottesi
970417.4	<i>Etheostoma mariae</i>	trib. to Drowning Creek	SR 1001	Scotland	17 April 1997	5	G.B. Mottesi
970417.4	<i>Notropis cummingsae</i>	trib. to Gum Swamp Creek	SR 1001	Scotland	17 April 1997	4	G.B. Mottesi
970417.4	<i>Semotilus lumbee</i>	trib. to Gum Swamp Creek	SR 1001	Scotland	17 April 1997	3	G.B. Mottesi
970417.4	<i>Umbra pygmaea</i>	trib. to Gum Swamp Creek	SR 1001	Scotland	17 April 1997	2	G.B. Mottesi
970515.2	<i>Aphredoderus sayanus</i>	trib. to Gum Swamp Creek	SR 1433	Scotland	17 April 1997	1	G.B. Mottesi
970515.2	<i>Esox niger</i>	Big Shoe Heel Creek	SR 1433	Scotland	15 May 1997	2	G.B. Mottesi
970515.2	<i>Etheostoma olmstedi</i>	Big Shoe Heel Creek	SR 1433	Scotland	15 May 1997	1	G.B. Mottesi
970515.2	<i>Lepomis auritus</i>	Big Shoe Heel Creek	SR 1433	Scotland	15 May 1997	1	G.B. Mottesi
970515.2	<i>Lepomis gibbosus</i>	Big Shoe Heel Creek	SR 1433	Scotland	15 May 1997	1	G.B. Mottesi
970515.2	<i>Lepomis macrochirus</i>	Big Shoe Heel Creek	SR 1433	Scotland	15 May 1997	1	G.B. Mottesi
970515.2	<i>Minytrema melanops</i>	Big Shoe Heel Creek	SR 1433	Scotland	15 May 1997	1	G.B. Mottesi
970515.3	<i>Aphredoderus sayanus</i>	trib. to Gum Swamp Creek	SR 1108	Scotland	15 May 1997	1	G.B. Mottesi
970515.3	<i>Chologaster cornuta</i>	trib. to Gum Swamp Creek	SR 1108	Scotland	15 May 1997	1	G.B. Mottesi
970515.3	<i>Elassoma zonatum</i>	trib. to Gum Swamp Creek	SR 1108	Scotland	15 May 1997	1	G.B. Mottesi
970515.3	<i>Esox americanus</i>	trib. to Gum Swamp Creek	SR 1108	Scotland	15 May 1997	2	G.B. Mottesi
970515.3	<i>Gambusia holbrooki</i>	trib. to Gum Swamp Creek	SR 1108	Scotland	15 May 1997	1	G.B. Mottesi
970515.3	<i>Umbra pygmaea</i>	trib. to Gum Swamp Creek	SR 1108	Scotland	15 May 1997	1	G.B. Mottesi
970612.1	<i>Ameiurus natalis</i>	trib. to Bryans Swamp	NC 211	Bladen	12 June 1997	6	G.B. Mottesi
970612.1	<i>Centrarchus macropterus</i>	trib. to Bryans Swamp	NC 211	Bladen	12 June 1997	3	G.B. Mottesi
970612.1	<i>Esox americanus</i>	trib. to Bryans Swamp	NC 211	Bladen	12 June 1997	2	G.B. Mottesi
970612.2	<i>Ameriurus natalis</i>	trib. to Bryans Swamp	NC 211	Bladen	12 June 1997	1	G.B. Mottesi
970612.2	<i>Aphredoderus sayanus</i>	Big Swamp	NC 211	Bladen/Rob. line	12 June 1997	1	G.B. Mottesi
970612.2	<i>Centrarchus macropterus</i>	Big Swamp	NC 211	Bladen/Rob. line	12 June 1997	1	G.B. Mottesi
970612.2	<i>Chologaster cornuta</i>	Big Swamp	NC 211	Bladen/Rob. line	12 June 1997	4	G.B. Mottesi
970612.2	<i>Enneacanthus gloriosus</i>	Big Swamp	NC 211	Bladen/Rob. line	12 June 1997	1	G.B. Mottesi
970612.2	<i>Erimyzon sucetta</i>	Big Swamp	NC 211	Bladen/Rob. line	12 June 1997	1	G.B. Mottesi
970612.2	<i>Esox americanus</i>	Big Swamp	NC 211	Bladen/Rob. line	12 June 1997	3	G.B. Mottesi
970612.2			NC 211	Bladen/Rob. line	12 June 1997	3	G.B. Mottesi

Table 2. Fish found in the Lumber River Basin (cont.)

Station No.	Scientific Name	Waterway	Common Locality	County	Date	No.	Identified By
970612.2	<i>Etheostoma serrafer</i>	Big Swamp	NC 211	Bladen/Rob. line	12 June 1997	1	G.B. Mottesi
970612.2	<i>Gambusia holbrooki</i>	Big Swamp	NC 211	Bladen/Rob. line	12 June 1997	abundant	G.B. Mottesi
970612.2	<i>Lepomis gibbosus</i>	Big Swamp	NC 211	Bladen/Rob. line	12 June 1997	21	G.B. Mottesi
970612.2	<i>Notropis cummingsae</i>	Big Swamp	NC 211	Bladen/Rob. line	12 June 1997	2	G.B. Mottesi
970612.2	<i>Umbra pygmaea</i>	Big Swamp	NC 211	Bladen/Rob. line	12 June 1997	1	G.B. Mottesi
970612.3	<i>Aphredoderus sayanus</i>	Big Swamp	SR 1004	Bladen/Rob. line	12 June 1997	21	G.B. Mottesi
970612.3	<i>Chologaster cornuta</i>	Big Swamp	SR 1004	Bladen/Rob. line	12 June 1997	5	G.B. Mottesi
970612.3	<i>Enneacanthus gloriosus</i>	Big Swamp	SR 1004	Bladen/Rob. line	12 June 1997	3	G.B. Mottesi
970612.3	<i>Exocoetidae</i>	Big Swamp	SR 1004	Bladen/Rob. line	12 June 1997	6	G.B. Mottesi
970612.3	<i>Gambusia holbrooki</i>	Big Swamp	SR 1004	Bladen/Rob. line	12 June 1997	abundant	G.B. Mottesi
970612.3	<i>Umbra pygmaea</i>	Big Swamp	SR 1004	Bladen/Rob. line	12 June 1997	5	G.B. Mottesi
970709.1	<i>Acantharcus pomotis</i>	Slender Branch	NC 242	Bladen	9 July 1997	2	G.B. Mottesi
970709.1	<i>Ameiurus natalis</i>	Slender Branch	NC 242	Bladen	9 July 1997	20	G.B. Mottesi
970709.1	<i>Aphredoderus sayanus</i>	Slender Branch	NC 242	Bladen	9 July 1997	4	G.B. Mottesi
970709.1	<i>Centrarchus macropterus</i>	Slender Branch	NC 242	Bladen	9 July 1997	22	G.B. Mottesi
970709.1	<i>Chaenobryttus gulosus</i>	Slender Branch	NC 242	Bladen	9 July 1997	4	G.B. Mottesi
970709.1	<i>Enneacanthus gloriosus</i>	Slender Branch	NC 242	Bladen	9 July 1997	7	G.B. Mottesi
970709.1	<i>Erimyzon oblongus</i>	Slender Branch	NC 242	Bladen	9 July 1997	6	G.B. Mottesi
970709.1	<i>Exocoetidae</i>	Slender Branch	NC 242	Bladen	9 July 1997	9	G.B. Mottesi
970709.1	<i>Lepomis gibbosus</i>	Slender Branch	NC 242	Bladen	9 July 1997	3	G.B. Mottesi
970709.1	<i>Lepomis macrochirus</i>	Slender Branch	NC 242	Bladen	9 July 1997	10	G.B. Mottesi
970709.1	<i>Notemigonus crysoleucas</i>	Slender Branch	NC 242	Bladen	9 July 1997	10	G.B. Mottesi
970709.2	<i>Centrarchus macropterus</i>	trib. of Crawley Swamp	SR 1112	Bladen	9 July 1997	42	G.B. Mottesi
970709.2	<i>Chaenobryttus gulosus</i>	trib. of Crawley Swamp	SR 1112	Bladen	9 July 1997	5	G.B. Mottesi
970709.2	<i>Gambusia holbrooki</i>	trib. of Crawley Swamp	SR 1112	Bladen	9 July 1997	abundant	G.B. Mottesi
970709.2	<i>Lepomis gibbosus</i>	trib. of Crawley Swamp	SR 1112	Bladen	9 July 1997	1	G.B. Mottesi
970709.2	<i>Lepomis macrochirus</i>	trib. of Crawley Swamp	SR 1112	Bladen	9 July 1997	3	G.B. Mottesi
970709.2	<i>Notemigonus chrysolaucas</i>	trib. of Crawley Swamp	SR 1112	Bladen	9 July 1997	6	G.B. Mottesi
970709.3	<i>Ameiurus natalis</i>	trib. of Crawley Swamp	NC 131	Bladen	9 July 1997	1	G.B. Mottesi
970709.3	<i>Centrarchus macropterus</i>	trib. of Crawley Swamp	NC 131	Bladen	9 July 1997	21	G.B. Mottesi
970709.3	<i>Exocoetidae</i>	trib. of Crawley Swamp	NC 131	Bladen	9 July 1997	3	G.B. Mottesi
970709.3	<i>Gambusia holbrooki</i>	trib. of Crawley Swamp	NC 131	Bladen	9 July 1997	common	G.B. Mottesi
970709.4	<i>Centrarchus macropterus</i>	Black Reedy Meadows Swamp	SR 1341	Bladen	9 July 1997	11	G.B. Mottesi
970721.1	<i>Ameiurus natalis</i>	Jordan's Swamp	NC 71	Robeson	21 July 1997	1	G.B. Mottesi
970721.1	<i>Aphredoderus sayanus</i>	Jordan's Swamp	NC 71	Robeson	21 July 1997	3	G.B. Mottesi
970721.1	<i>Centrarchus macropterus</i>	Jordan's Swamp	NC 71	Robeson	21 July 1997	57	G.B. Mottesi



Table 2. Fish found in the Lumber River Basin (cont.)

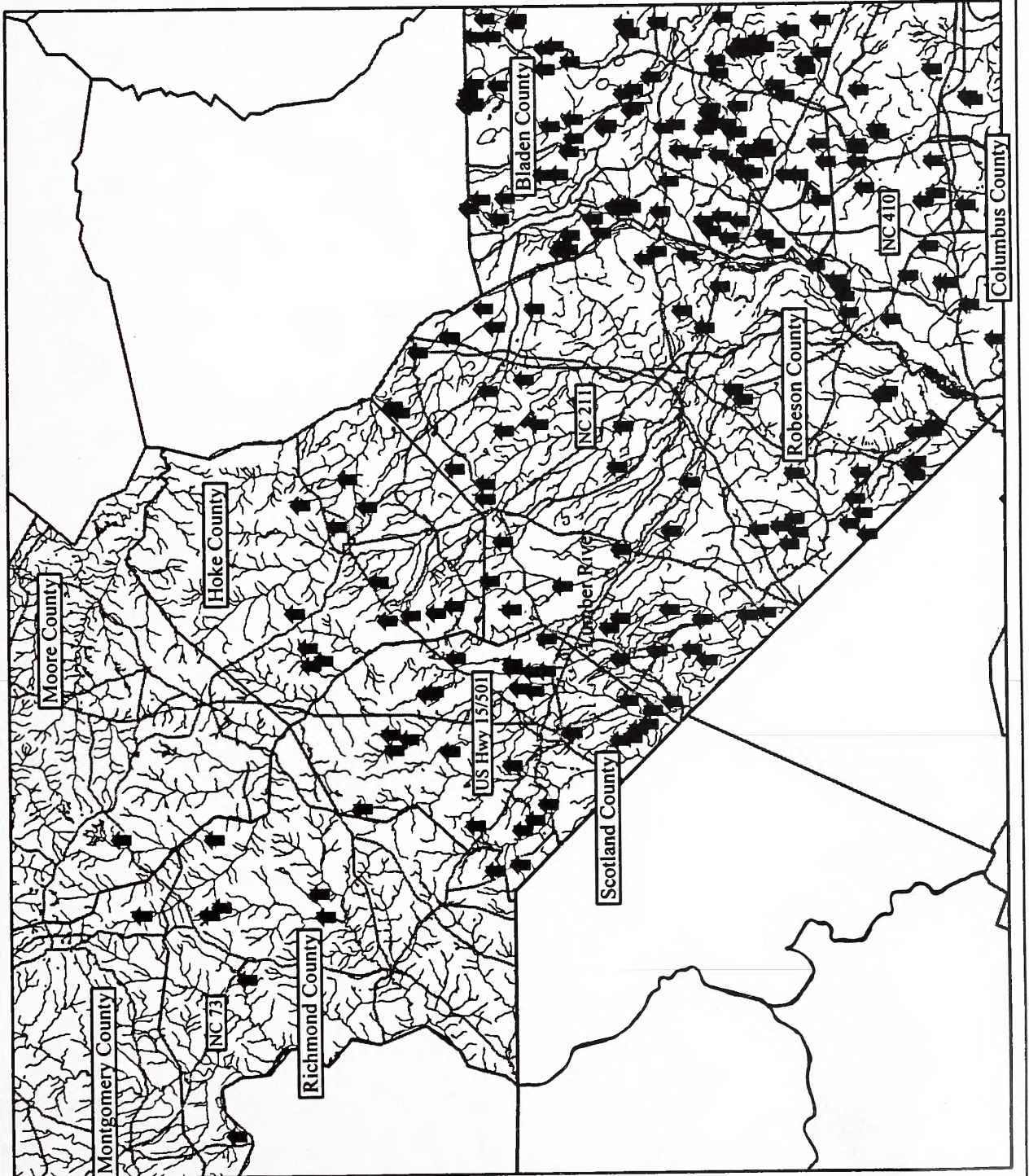
<u>Station No.</u>	<u>Scientific Name</u>	<u>Waterway</u>	<u>Common Locality</u>	<u>County</u>	<u>Date</u>	<u>No.</u>	<u>Identified By</u>
970721.1	<i>Chaenobryttus gulosus</i>	Jordan's Swamp	NC 71	Robeson	21 July 1997	1	G.B. Mottesi
970721.1	<i>Enneacanthus chaetodon</i>	Jordan's Swamp	NC 71	Robeson	21 July 1997	4	G.B. Mottesi
970721.1	<i>Enneacanthus gloriosus</i>	Jordan's Swamp	NC 71	Robeson	21 July 1997	1	G.B. Mottesi
970721.1	<i>Enneacanthus obesus</i>	Jordan's Swamp	NC 71	Robeson	21 July 1997	1	G.B. Mottesi
970721.1	<i>Erimyzon sucetta</i>	Jordan's Swamp	NC 71	Robeson	21 July 1997	1	G.B. Mottesi
970721.1	<i>Esox americanus</i>	Jordan's Swamp	NC 71	Robeson	21 July 1997	abundant	G.B. Mottesi
970721.1	<i>Gambusia holbrooki</i>	Jordan's Swamp	NC 71	Robeson	21 July 1997	2	G.B. Mottesi
970721.1	<i>Notemigonus crysoleucas</i>	Jordan's Swamp	NC 71	Robeson	21 July 1997	1	G.B. Mottesi
970721.2	<i>Aphredoderus sayanus</i>	Bear Swamp	SR 1003	Robeson	21 July 1997	1	G.B. Mottesi
970721.2	<i>Chologaster cornuta</i>	Bear Swamp	SR 1003	Robeson	21 July 1997	7	G.B. Mottesi
970721.2	<i>Elassoma zonatum</i>	Bear Swamp	SR 1003	Robeson	21 July 1997	6	G.B. Mottesi
970721.2	<i>Gambusia holbrooki</i>	Bear Swamp	SR 1003	Robeson	21 July 1997	2	G.B. Mottesi
970721.2	<i>Umbra pygmaea</i>	Bear Swamp	SR 1003	Robeson	21 July 1997	1	G.B. Mottesi
970722.1	<i>Etheostoma serrifer</i>	Richland Swamp	SR 1318	Robeson	22 July 1997	abundant	G.B. Mottesi
970722.1	<i>Gambusia holbrooki</i>	Richland Swamp	SR 1318	Robeson	22 July 1997	1	G.B. Mottesi
970722.1	<i>Lepomis gibbosus</i>	Richland Swamp	SR 1318	Robeson	22 July 1997	3	G.B. Mottesi
970722.1	<i>Micropterus salmoides</i>	Richland Swamp	SR 1318	Robeson	22 July 1997	1	G.B. Mottesi
970722.1	<i>Notropis chalybaeus</i>	Richland Swamp	SR 1318	Robeson	22 July 1997	1	G.B. Mottesi
970722.2	<i>Aphredoderus sayanus</i>	Toney's Creek	SR 1138	Hoke	22 July 1997	1	G.B. Mottesi
970722.2	<i>Centrarchus macropterus</i>	Toney's Creek	SR 1138	Hoke	22 July 1997	1	G.B. Mottesi
970722.2	<i>Elassoma zonatum</i>	Toney's Creek	SR 1138	Hoke	22 July 1997	8	G.B. Mottesi
970722.2	<i>Gambusia holbrooki</i>	Toney's Creek	SR 1138	Hoke	22 July 1997	abundant	G.B. Mottesi
970722.2	<i>Lepomis macrochirus</i>	Toney's Creek	SR 1138	Hoke	22 July 1997	1	G.B. Mottesi
970723.1	<i>Aphredoderus sayanus</i>	Muddy Creek	SR 1328	Scotland	23 July 1997	5	G.B. Mottesi
970723.1	<i>Chologaster cornuta</i>	Muddy Creek	SR 1328	Scotland	23 July 1997	1	G.B. Mottesi
970723.1	<i>Elassoma zonatum</i>	Muddy Creek	SR 1328	Scotland	23 July 1997	1	G.B. Mottesi
970723.1	<i>Enneacanthus gloriosus</i>	Muddy Creek	SR 1328	Scotland	23 July 1997	2	G.B. Mottesi
970723.1	<i>Notropis chalybaeus</i>	Muddy Creek	SR 1328	Scotland	23 July 1997	3	G.B. Mottesi

## **Animal Facilities**

The following map shows the animal facilities near and around the Lumber River Basin. This information was acquired from the Water Quality Section, Division of Environmental Management, North Carolina Department of Environment, Health, and Natural Resources.



# LUMBER RIVER BASIN ANIMAL FACILITIES









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